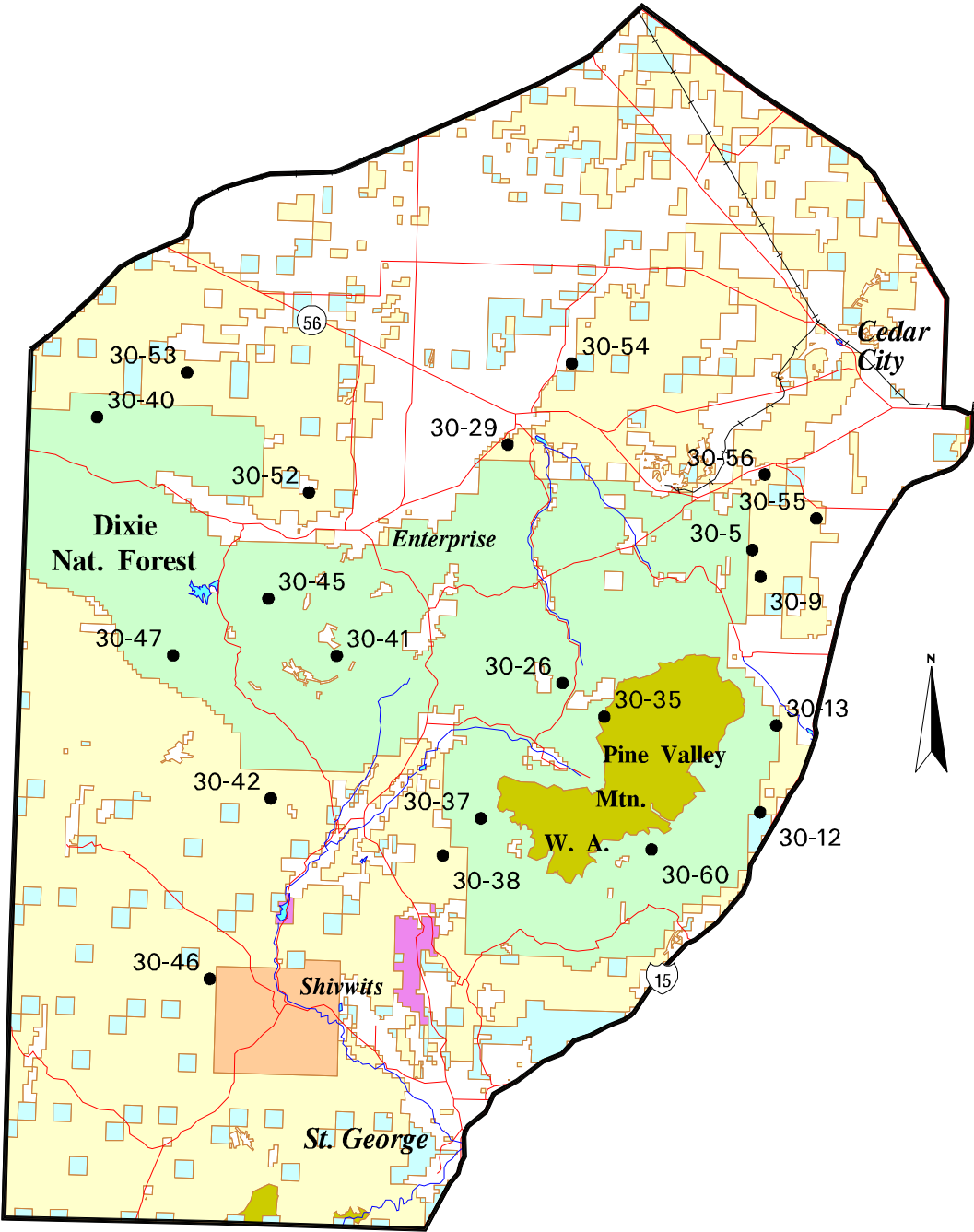














# Management Unit 30

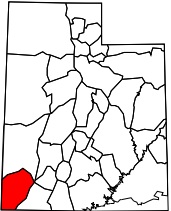


Map Scale 1:633,600 (1" = 10 miles)

## Legend

	Forest Service		Private Land		Transect Location
	BLM		FS/BLM Wild. Area		Road
	State of Utah		Snow Cyn. State Park		Railroad
	Native American Reservation		Water Body		Perennial Stream

## Unit Location



## WILDLIFE MANAGEMENT UNIT 30 (50A&B)- PINE VALLEY

### Boundary Description

**Iron and Washington counties** - Boundary begins at I-15 and the Utah-Arizona state line; north on I-15 to SR-56; west on SR-56 to the Lund Highway; northwest along the Lund Highway to the Union Pacific railroad tracks at Lund; southwest on the Union Pacific railroad tracks to the Utah-Nevada state line; south on this state line to the Utah-Arizona state line; west on this state line to I-15 and beginning point.

This unit was divided into 3 sub units; 30A West Pine Valley, 30B Commanche and 30C Pine Valley/Browse prior to 1992. Subunits A & B were combined in 1992.

### Management Unit Description

Management unit 30A (formally 50A) is one of the smaller units in the state. Total area equals 227,200 acres. Of this amount, approximately 111,808 acres are winter range and 41,300 acres are summer range. The remaining 74,092 acres are considered non-habitat (Coles and Pederson 1969). In the past, the assumption has been that summer range is a limiting habitat factor on this unit. However, in reality, the situation is not that simple. Unit 30A is not independent of the surrounding units as it shares a common summer range with unit 30B. In addition, the important winter range areas of unit 30B shelter and feed substantial numbers of deer that summer within unit 30A. There is also a resident deer population in the New Harmony area which further complicates management. Of all the herd subunits in the state, 30A is perhaps the most (contrived) artificial.

Summer range is confined to elevations above 6,000 to 6,500 feet on the New Harmony and Pine Valley mountains. The vegetational character is principally oakbrush and mountain brush on the Harmony Mountains and on the lower slopes of the Pine Valleys. Aspen and coniferous types are common on the higher portions of the Pine Valley Mountains, but much less prevalent on the Harmony Mountains. Sagebrush-grass parks and meadowlands can be found at the summit of the Harmony Mountains. These are important areas to deer for short periods during the summer which have been heavily impacted by cattle. Many similar, but more interspersed parklands occur on the northern end of the Pine Valley Mountains. Summer deer concentrations are primarily on the Harmony Mountain and the north end of the Pine Valleys. Relatively few deer summer south of Timber Mountain within unit 30A.

Herd unit 30A winter range varies greatly, depending upon elevation. North of the Great Basin-Colorado River divide, pinyon-juniper and sagebrush-grass predominate. South of the divide, pinyon-juniper is still important, but there are increasing amounts of a desert shrub type dominated by shrub live oak (*Quercus turbinella*) and several other browse species not often found to the north. Both areas possess important acreages of seeded range, most notably east of Pinto at Page Ranch, Woolsey Ranch, New Harmony and Pintura Bench. Deer tend to concentrate on these sites, especially the latter three. The winter range south of Pintura currently supports few deer. A comprehensive study conducted by the Southern Region of the Division of Wildlife Resources on deer population dynamics and habitat use, has contributed greatly to understanding of this herd unit. This study was especially helpful in locating trend studies on critical sites. For example, it is now evident that fawning and fawn rearing habitat are very critical for this unit. Accordingly, studies have been located at known fawning areas. In addition, the winter range is now better defined and critical areas have been identified. These sites were also sampled.

### Livestock Grazing

Critical winter range sites sampled again include: Upper Broad Hollow (#3), Pintura Bench (#12), and Black Ridge (#13). Upper Broad Hollow is administered by the BLM. It is located in the summer pasture of the BLM

Rock Spring cattle allotment. Grazing occurs from June 1 through September 30 annually. In June, the cattle are trailed up to Harmony Mountain. As the cattle drift back down the mountain in the fall, they utilize the relatively steep, south facing slopes of the study area.

All other winter range study sites on this unit occur on National Forest land. Pintura bench is on an unallotted area and is not grazed. Black Ridge occurs on the New Harmony allotment which is grazed on a rest rotation system by 40 cattle from June 1 to September 30.

Summer range sites administered by the BLM include Harmony Mountain Summit (#5) and Upper Lime Spring (#9). Harmony Mountain Summit and Upper Lime Spring are located in the Summer Pasture of the BLM Rock Spring cattle allotment mentioned earlier. Cattle use likely occurs from June 1 through September 30 annually.

The other study sites occur on land administered by the U.S. Forest Service. Four sites are found on the east side of the Pine Valley Mountains in an area which was burned in the early summer of 1986. These sites include: Spirit Creek South Burn (#58), Upper Horse Creek (#59), and Jones Hollow (#60). Cattle grazing was removed from this area in the 1960's for watershed protection. The other summer range sites, Grant's Range Trail (#18), Big Water Reservoir (#19), and Upper Comanche Canyon (#21), were not read in 1998 and are being discontinued. They occur in the Pine Valley roadless area. These sites are within the Pine Valley grazing allotment and are used by 1,057 cattle from July 15 to October 15. Due to drought conditions, the number of cattle were reduced by 35% in 1990, 25% in 1991 and 15% in 1992.

#### Management Unit 30B (50B) - West Pine Valley

Deer herd unit 30B is a combination of the old deer herd units 61B and 61C which were combined in 1992. Deer herd unit 30A, previously deer herd unit 61A, lies to the east of 30B. Winter range for 30B is estimated to be 500,600 acres and summer range is estimated at 217,000 acres (Jense et al. 1993). The herd unit varies from altitudes of 10,000 feet on the Pine Valley Mountains to lower and drier areas such as Motoqua at an elevation of 4,000 feet. Vegetationally, the summer range consists of dense conifers with a few aspen clones and dry meadows at higher elevations, and mixed oakbrush, mountain brush, southern desert shrub, and sagebrush-grass on lower areas. Most of the summer range is within the officially designated "wilderness area" which is open to livestock use.

Winter range is extensive, but not uniformly utilized. Pinyon-juniper is the dominant vegetative type, but there are also large areas of sagebrush-grass, southern desert shrub, oakbrush, and mountain brush. Important critical winter concentration areas include: Truman Bench, the area east of Central, the lower Pinto Creek drainage, the Antelope Range, Iron Mountain, the Shoal Creek drainage, Moody Creek, Tobin Bench, and the upper portion of the East Fork of Beaver Dam Wash. Only during the most severe winters do deer utilize the lower portions of the winter range, especially the Sonoran desert areas. During the spring, summer, and fall, critical concentration areas include: the higher elevations of the Bull Valley Mountains, Lost Peak, Maple Ridge, the slopes surrounding Pine Valley Reservoir, the meadows of the Whipple Valley area, and Flattop Mountains.

#### Livestock Grazing

##### Winter Range

Six of the 8 study sites which occur on winter range are administered by the BLM. These include: Southwest of Newcastle (#29), Sevy Hollow (#53), Wide Canyon (#38), Northwest of Enterprise (#52), Grapevine Spring (#42), and Pahcoon Bench (#46). Truman Bench (#37) and Telegraph Draw (#40) are administered by the Forest Service.

Southwest of Newcastle is part of the Pinto Creek allotment which is grazed after the growing season, from August 1 to November 15. Since 1982, cattle grazing has been eliminated in order to enhance site conditions.

The Truman Bench study site is located in an area of Forest Service property that has not been allotted for livestock use since the 1960's. The Telegraph Draw and Sevy Hollow study sites are located in the USFS Terryshoal Creek allotment in a pasture that is set aside for wild horses and burros and is not grazed by livestock. Wide Canyon lies within the Wide Canyon pasture of the Veyo allotment. Cattle use is authorized from November 16 to June 28.

The study, Northwest of Enterprise is located in the Haystack Mountain BLM cattle allotment. It is grazed under a deferred rotation grazing system with use alternating from spring (April 1 until May 16) to fall and winter (Nov 1 until Jan. 31). Grapevine Spring is in the Cactus pasture of the Twin Peaks allotment which is grazed from November through May under a three pasture deferred rotation grazing system which provides spring rest two years out of every three. Long term utilization studies by the BLM indicate moderate use (40% to 60%). Pahcoon Bench lies within the Pahcoon Seeding pasture of the Jackson Wash allotment. Cattle use is allowed from November 16th through May 20, but use on the Pahcoon Seeding pasture occurs from November 16 to December 31 each year.

#### Summer Range

The Grassy Flat Ridge (#26), Paradise (#24), and Deep Canyon (#35) studies are located on the USFS Pine Valley allotment. This allotment is grazed from July 15 to October 15 and encompasses about 67,000 acres. Due to increased pressure on riparian areas, the number of cattle allowed to graze was reduced in 1990 through 1992. Before this time, 1,057 head of cattle were allotted. Livestock are managed on a deferred rotation system each year. The Joe Spring (#41) study site is on the USFS Gunlock allotment and is grazed from July 15 to September 30 by 621 head of cattle. The Lost Peak (#47) study site is on the USFS Bull Valley allotment. The livestock are managed by alternating spring and fall grazing each year.

#### Herd Unit Management Objectives

Current management objectives are to maintain limited entry hunting on the Browse and Comanche units on the east side of the Pine Valley Mountains, along with the high country buck hunt on the Pine Valley Wilderness area. A hunter success rate of 50% or better is wanted on the limited entry hunts but these areas are not currently providing the expected quality of a limited entry hunt.

Target winter herd sizes for the entire unit is modeled at 16,000 deer with 2,000 of these from the Comanche subunit, and 1,000 from the Browse subunit. Herd composition for the West Pine Valley area is to be managed at 15 bucks:100 does with 30% of the bucks being 3 point or better. The Browse and Comanche areas will be managed to produce 20 bucks:100 does post season, with 50% or more of those bucks being 3 point or larger.

#### Trend Study Site Description

Trend study sites were originally established on the unit in 1982. Most of these sites were reread in 1992. In 1986, 4 study sites were established on a burned area on the east side of the Pine Valley mountains. These sites were reread in 1987, 1992 and 1998. In 1998, several of the sites established in 1982 were discontinued and 3 sites were reread that were not read in 1992. In addition, 4 new study sites were established to cover important areas which were not previously being monitored. Text for discontinued sites can be found at the end of the Unit 30 section.

### Trend Study 30-3-98

Study site name: Upper Broad Hollow .

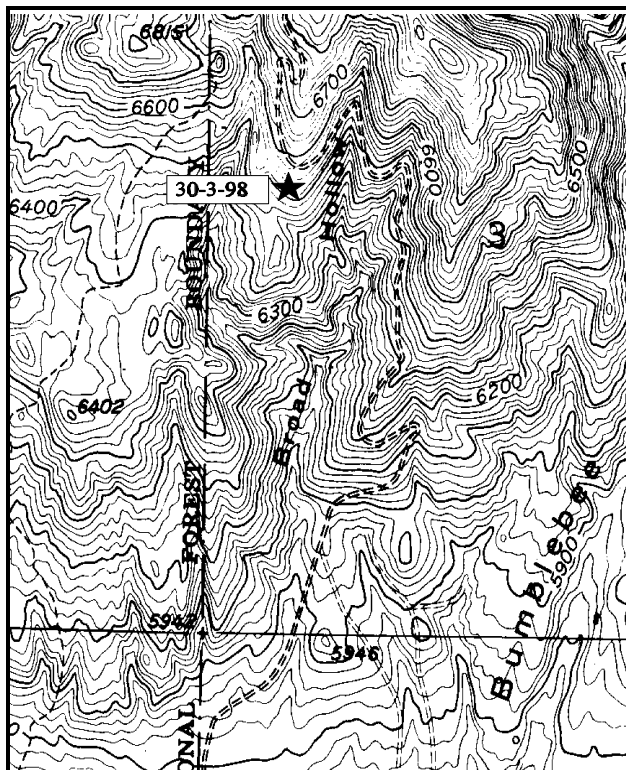
Range type: Mountain Brush .

Compass azimuth: frequency baseline 220 degrees. (Line 2 & 3 0°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (8 & 89ft), line 2 (34 & 71ft), line 3 (59ft).

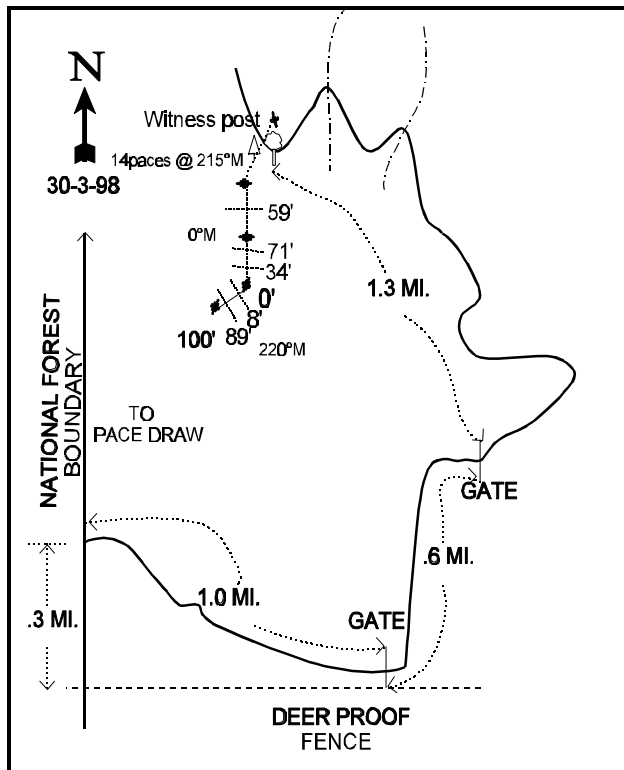
### LOCATION DESCRIPTION

From the Dixie National Forest boundary, proceed north on Pace Draw Road for 0.30 miles. Turn right onto Harmony Mountain Road and travel 1.0 miles, at which point there will be a gate. Go through the gate, turn left and travel 1.95 miles to a sharp right-hand turn in the road. On the southwestern side of the road is a witness post. Walk 14 paces at 215°M to the 300-foot of the baselines. The 0-foot stake is 200 feet. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.



Map Name: Stoddard Mountain

Township 38S , Range 13W , Section 3



Diagrammatic Sketch

UTM 4154969.278 N, 296258.725 E

## DISCUSSION

### Trend Study No. 30-3 (50A-3)

This site at Upper Broad Hollow is intermediate in elevation, but is still critical deer winter range. Elevation is 6,500 feet, slightly above the juniper-pinyon belt with a southerly aspect and a steep slope of 35%. The range type is a mixed mountain brush, which varies somewhat in composition depending upon slope, exposure, and micro-site characteristics. On steeper south or west slopes, mountain big sagebrush and antelope bitterbrush prevail. On more easterly slopes, there is more shrub-live oak and Utah serviceberry with considerable amounts of bitterbrush, and occasional clumps of Gambel oak. Deer use of the entire area, judging from levels of utilization and the number of pellet groups observed, is moderate to heavy. Data from the nearby Broad Hollow pellet group transect taken from 1988 through 1992, indicate heavy deer use with an average of 75 deer days use/acre, the highest average on the herd unit (Jense et al. 1992). No signs of livestock grazing were noticed. Pellet group data from the site taken in 1998 also estimate a high level of deer use at 110 deer days use/acre.

Soils are shallow, rocky, and derived from limestone parent material. Effective rooting depth (see methods) is estimated at only a little over 7 inches. Rocks are very common on the surface and within the soil profile. Erosion is not currently a serious problem due to the abundant protective ground cover.

The key browse species are Utah Serviceberry, mountain big sagebrush, and antelope bitterbrush. Important secondary species would include curlleaf mountain mahogany. Big sagebrush currently ('98) provides 28% of the browse cover on the site. It has remained at a relatively similar density since 1982 at around 2,300 plants/acre. Utilization has been moderate with little heavy use. Vigor has remained good on most plants and percent decadence has increased slightly from 18% in 1982 to 24% by 1998. Reproduction is good with a steadily increasing proportion of young plants.

Bitterbrush displays heavier use, especially in 1992 when 69% of the plants were classified as heavily hedged. Currently ('98), 55% are heavily utilized with an additional 32% moderately hedged. Density declined by 50% (2,133 to 1,066 plants/acre) between 1982 and 1992, but has since increased by 19% to 1,320 plants/acre by 1998. Some of the difference in density may be due to the much larger sample taken in 1998. Vigor is currently good and percent decadence has declined from a high of 31% in 1992 to 14% by 1998. Reproduction is adequate to maintain the population.

Utah serviceberry, curlleaf mountain mahogany, and shrub-live oak are mainly large, mature populations. Serviceberry was encountered in higher density with the larger sample used in 1998. Currently, the population density is estimated at 1,880 plants/acre. The average mature plant is about 4 feet in height. Utilization is mostly light to moderate with some heavy use on certain plants. Vigor is normal on most plants, percent decadency low and reproduction adequate to maintain the population. Occasional shrubs which occur on the site, but were not encountered on the density plots in 1982 and 1992 include: true mountain mahogany, narrowleaf low rabbitbrush, grey horsebrush, broom snakeweed, yellowleaf silktassel, Colorado pinyon, Utah juniper, and a low woody eriogonum. The new and much larger sample used in 1998 picked up many of these species in low numbers. Point quarter data from 1998 estimate 26 pinyon and 12 juniper trees/acre. Average basal diameter is 8 inches for pinyon and 7 inches for juniper.

Due to the soil conditions, grasses and forbs are fairly sparse, but moderately diverse. Currently ('98), 6 perennial and one annual grass produce 24% cover. The most common species is mutton bluegrass which provides 54% of that cover. The annual, cheatgrass, is also common providing an additional 39% of the grass cover. All other grasses occur occasionally. Forbs are very diverse but the 17 annual and perennial species encountered in 1998 produce only 4.5% cover. The only common species include: false dandelion, milkvetch, tansy mustard, bluedicks (*Dichelostemma pulchellum*), and storksbill.

## 1982 APPARENT TREND ASSESSMENT

Soil trend appears stable to declining. Erosion is ongoing but not greatly excessive, considering the character of the site. Vegetative trend is also stable but will depend in large part on future soil conditions. At present, browse populations seem healthy but static. Herbaceous understory conditions are fair but somewhat precarious. This is a relatively fragile site that could rapidly deteriorate if animal use, especially from livestock, were to become much more intense than it is now.

## 1992 TREND ASSESSMENT

The soil trend is slightly up due to increased total protective ground cover. Basal vegetative cover has increased along with a 59% decrease in bare ground. Trend for browse is down due to declining populations of mountain big sagebrush and especially bitterbrush. Bitterbrush declined 50% in density and percent decadency increased to 31%. The number of heavily hedged plants rose from 22% in 1982 to 69% in 1992, while the number of plants displaying poor vigor also increased (0 to 13%). Trend for herbaceous understory is stable with increased quadrat frequency for perennial grasses and decreased quadrat frequency of perennial forbs.

### TREND ASSESSMENT

soil - slightly up, but still in poor condition

browse - down

herbaceous understory - stable

## 1998 TREND ASSESSMENT

Trend for soil appears stable. Percent bare ground declined slightly, but percent rock and pavement cover increased from 24% to 33% and litter cover declined slightly. Trend for key browse species, mountain big sagebrush, bitterbrush and serviceberry, appear stable. Sagebrush displays similar density, light to moderate use, good vigor, improved reproduction, and percent decadency of 24%. Bitterbrush also shows a similar density compared to 1992. Use continues to be moderate to heavy, but vigor has improved and percent decadence has declined from 31% to 14%. More serviceberry was picked up in the much larger sample used in 1998. It shows lighter use, good vigor, and low decadence. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has declined slightly while frequency of perennial forbs has increased. Mutton bluegrass increased significantly in nested frequency, while bottlebrush squirreltail declined significantly. Overall, trend for the herbaceous understory is considered up.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - up

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 3

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	-	-	-	-	-	.03
G	Bouteloua gracilis	2	3	-	2	1	.15
G	Bromus tectorum (a)	-	264	-	-	86	9.47
G	Festuca ovina	-	3	-	-	1	.00

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Koeleria cristata	34	31	13	12	17	.81
G	Poa fendleriana	166	*216	45	65	74	13.11
G	Sitanion hystrix	118	*19	37	49	10	.31
G	Stipa comata	7	6	13	3	3	.36
Total for Annual Grasses		0	264	0	0	86	9.47
Total for Perennial Grasses		327	278	108	131	106	14.79
Total for Grasses		327	542	108	131	192	24.26
F	Agoseris glauca	6	*46	3	3	26	.58
F	Allium spp.	-	*10	-	-	4	.04
F	Androstaphyrum breviflorum	1	-	-	1	-	-
F	Artemisia ludoviciana	18	*-	5	6	-	-
F	Astragalus straturensis	7	*-	35	4	-	-
F	Aster spp.	-	1	-	-	1	.00
F	Astragalus spp.	32	19	-	19	13	.91
F	Brodiaea pulchella	-	-	8	-	-	-
F	Astragalus utahensis	-	-	-	-	-	.03
F	Castilleja linariaefolia	23	6	13	8	3	.06
F	Collinsia parviflora (a)	-	14	-	-	7	.03
F	Cymopterus spp.	-	8	-	-	3	.06
F	Descurainia pinnata (a)	-	57	-	-	26	.38
F	Dichelostemma pulchellum	-	*33	-	-	16	1.55
F	Draba spp. (a)	-	2	-	-	1	.00
F	Eriogonum caespitosum	-	-	2	-	-	-
F	Erysimum asperum	4	3	-	2	2	.03
F	Erodium cicutarium (a)	-	13	-	-	6	.52
F	Erigeron pumilus	1	8	3	1	4	.07
F	Lactuca serriola	6	-	-	2	-	-
F	Lotus utahensis	-	-	1	-	-	-
F	Microsteris gracilis (a)	-	10	-	-	6	.03
F	Oenothera caespitosa	-	-	1	-	-	-
F	Orobanch uniflora	-	-	2	-	-	-
F	Sphaeralcea grossulariaefolia	-	6	-	-	3	.06
F	Stephanomeria tenuifolia	16	16	8	9	6	.13
F	Zigadenus paniculatus	-	3	-	-	1	.00
Total for Annual Forbs		0	96	0	0	46	0.97
Total for Perennial Forbs		114	159	81	55	82	3.57
Total for Forbs		114	255	81	55	128	4.54

\* Indicates significant difference at % = 0.10 (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 3

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	30	12.87
B	Artemisia tridentata vaseyana	64	8.79
B	Cercocarpus ledifolius	0	-
B	Chrysothamnus parryi parryi	6	.30
B	Chrysothamnus viscidiflorus viscidiflorus	5	.15
B	Garrya flavescens	4	-
B	Gutierrezia sarothrae	1	-
B	Juniperus osteosperma	1	.78
B	Opuntia spp.	3	.15
B	Pinus edulis	3	2.99
B	Purshia tridentata	34	5.40
B	Quercus turbinella	4	.39
B	Tetradymia canescens	1	.03
Total for Browse		156	31.87

## CANOPY COVER --

Herd unit 30 , Study no: 3

Species	Percent Cover '98
Juniperus osteosperma	5
Pinus edulis	4

## BASIC COVER --

Herd unit 30 , Study no: 3

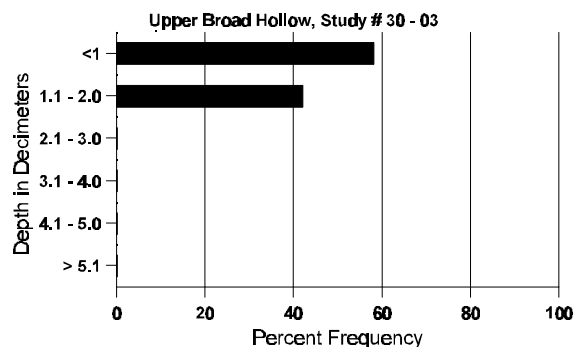
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	350	13.00	15.25	50.70
Rock	271	14.00	19.50	27.54
Pavement	195	-	4.25	5.34
Litter	381	49.00	51.75	45.95
Cryptogams	2	3.00	0	.03
Bare Ground	159	21.50	9.25	7.44

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 03, Study Name: Upper Broad Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.3	43.5 (11.2)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 3

Type	Quadrat Frequency '98
Rabbit	29
Deer	59

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 3

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	3	-	-	2	-	-	11	-	-	16	-	-	-	320			16
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	2	-	-	-	-	-	2	-	-	-	133			2
	98	10	-	-	4	1	-	-	-	-	15	-	-	-	300			15
M	82	1	-	-	-	1	-	1	-	-	1	-	-	200	33	41	3	
	92	1	-	2	-	-	-	-	-	-	3	-	-	200	34	36	3	
	98	27	23	1	22	1	-	-	-	-	74	-	-	-	1480	50	55	74
D	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	1	-	1	3	-	-	-	-	-	3	-	-	2	100			5
X	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	240			12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		33%			00%			00%			+40%							
'92		00%			40%			00%			+82%							
'98		27%			02%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	200	Dec:	0%			
												'92	333		0%			
												'98	1880		5%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	82	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	92	2	-	-	2	-	-	-	-	-	4	-	-	-	266		4	
	98	16	-	-	2	-	-	-	-	-	18	-	-	-	360		18	
M	82	13	12	4	-	-	-	-	-	-	28	1	-	-	1933	18	26	
	92	4	14	3	-	1	-	-	-	-	22	-	-	-	1466	16	18	
	98	44	23	-	2	-	-	-	-	-	69	-	-	-	1380	20	30	
D	82	5	-	-	2	-	-	-	-	-	3	4	-	-	466		7	
	92	4	1	-	2	-	-	-	-	-	7	-	-	-	466		7	
	98	19	5	1	3	-	-	-	-	-	18	1	-	9	560		28	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	980		49	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		31%			10%			00%			-15%							
'92		48%			09%			00%			+ 4%							
'98		24%			.86%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	2599	Dec:	18%			
												'92	2198		21%			
												'98	2300		24%			
Cercocarpus ledifolius																		
M	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133	47	51	
	92	-	-	-	-	-	1	-	-	-	1	-	-	-	66	106	106	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-50%							
'92		00%			100%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	-			
												'92	66		-			
												'98	0		-			
Chrysothamnus parryi parryi																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	18	-	-	6	-	-	-	-	-	24	-	-	-	480	12	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	520		-			
Chrysothamnus viscidiflorus viscidiflorus																		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120	14	6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	160		-			
Garrya flavescens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	8	-	-	1	-	-	-	-	-	9	-	-	-	180	55	9	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	200		10%			
Gutierrezia sarothrae																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	10	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	1	-	1	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			
Opuntia spp.																		
M	82	2	-	-	-	-	-	-	-	-	-	2	-	133	3	8	2	
	92	3	-	-	-	-	-	-	-	-	1	-	2	200	6	8	3	
	98	2	-	-	1	-	-	-	-	-	3	-	-	60	5	11	3	
D	82	1	-	-	-	-	-	-	-	-	-	1	-	66			1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 1%							
'92		00%			00%			67%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	199	Dec:	33%			
												'92	200		0%			
												'98	60		0%			
Pinus edulis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	20			1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	40	-	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	60		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	1	1	-	-	-	-	-	-	4	-	1	-	333		5	
	98	3	-	-	-	1	-	-	-	-	4	-	-	-	80		4	
M	82	9	10	2	-	-	5	6	-	-	32	-	-	-	2133	24	32	
	92	-	-	6	-	-	-	-	-	-	6	-	-	-	400	20	35	
	98	1	12	30	5	5	-	-	-	-	53	-	-	-	1060	26	39	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	4	-	-	-	-	-	-	4	-	1	-	333		5	
	98	-	2	5	-	1	1	-	-	-	6	-	-	3	180		9	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		31%			22%			00%			-50%							
'92		13%			69%			13%			+19%							
'98		32%			55%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	2133	Dec:	0%			
												'92	1066		31%			
												'98	1320		14%			
Quercus turbinella																		
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	-	-	1	-	-	-	-	-	1	1	-	-	133		2	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	82	2	-	-	-	-	-	1	-	-	3	-	-	-	200	45	55	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	66	39	47	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	36	40	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	3	-	-	-	-	-	-	-	3	-	-	200		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+33%							
'92		17%			50%			00%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	266	Dec:	0%			
												'92	399		50%			
												'98	120		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	7	8	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:	-		
												'92		0		-		
												'98		20		-		

### Trend Study 30-5-98

Study site name: Harmony Mountain Summit .

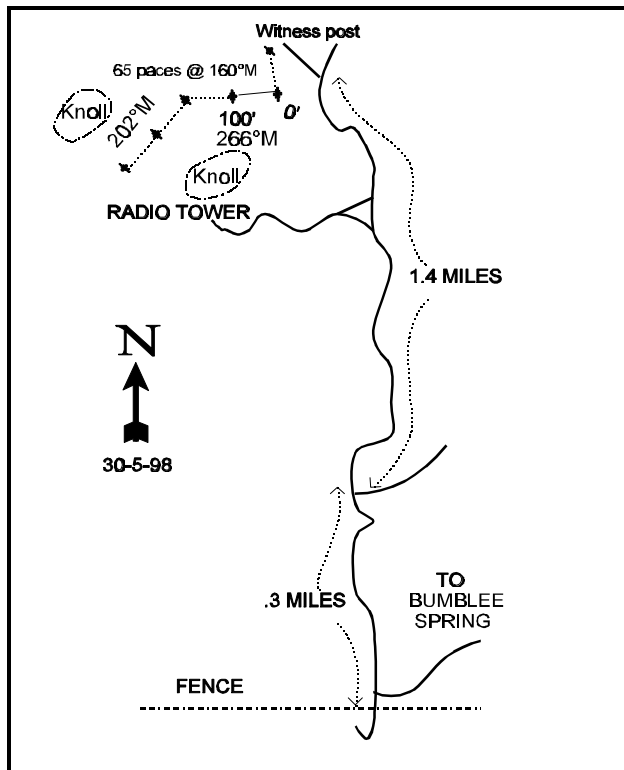
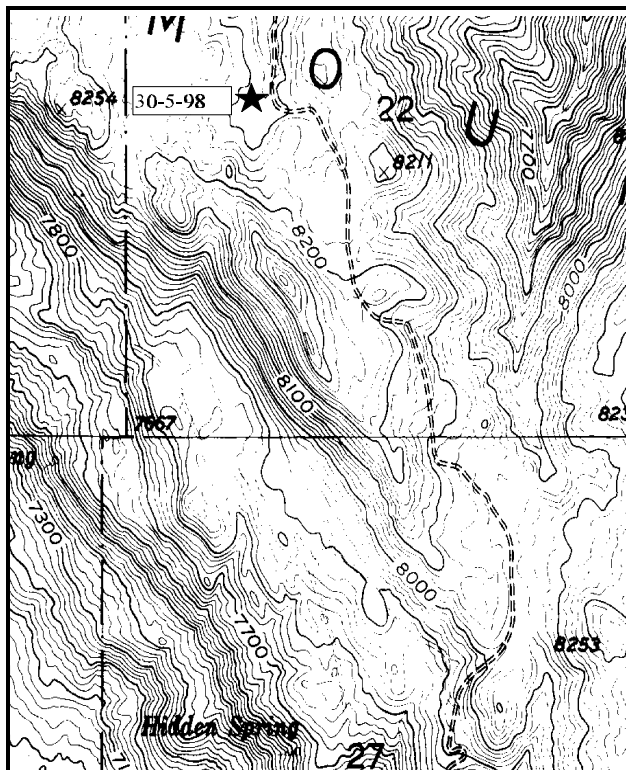
Range type: Low Rabbitbrush .

Compass azimuth: frequency baseline 266 M degrees. (Lines 3 & 4 202°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (12 & 87ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

### LOCATION DESCRIPTION

From the Dixie National Forest boundary north of New Harmony, proceed north 0.3 miles on Pace Draw Road. Turn right on Harmony Mountain Road and drive 1.60 miles, at which point you should come to a gate. From the fence continue on the main road 4.4 miles to a fork. Stay left and continue on the main road. At 0.3 miles stay left again and continue on the main road 1.4 miles to a fork. Continue left less than 0.1 miles to a witness post on the left (south) side of the road. From the witness post walk 65 paces at 160 degrees magnetic to the 0-foot stake. The study is marked by green steel fence posts approximately 18 to 24 inches in height.



Map Name: Stoddard Mountain

Diagrammatic Sketch

Township 37S , Range 13W , Section 22

UTM 4159822.538 N, 296543.628 E

## DISCUSSION

### Trend Study No. 30-5 (50A-5)

The Harmony Mountain Summit trend study monitors deer summer range at 8,100 feet elevation near the summit of Harmony Mountain. Slope is 10% to 15% with a northeast aspect. This area is characterized by open parks interspersed with scattered aspen and oak clones. The area has been heavily impacted by domestic livestock grazing and undergone a nearly complete type conversion to rabbitbrush. What formerly was a mountain big sagebrush-grass type is now dominated by stickyleaf low rabbitbrush, needlegrass species, and limited numbers of increaser forb species. Cattle were using the site in mid-June of 1992. Deer also utilize the area in summer as two does were encountered on the site during the 1992 reading. Pellet group data taken on the site in 1998 estimates 73 deer and 26 cow days use/acre. Many of the deer pellet groups appeared to be relatively recent. Cattle pats appeared to be older, although cows were seen down the road from the site.

Soils are relatively deep and formed by sedimentation from surrounding ridges. Effective rooting depth (see methods) is estimated at just over 17 inches. Soil texture is a sandy loam with a strongly acid pH (5.4). Soil organic matter is comparatively high at 4.5%. The principal soil disturbance is the activities of pocket gophers and rock squirrels, and the trampling of livestock. Soil erosion is minimal due to the abundant vegetation and litter cover.

The key browse species is mountain big sagebrush, although it only provides 37% of the browse cover, while stickyleaf low rabbitbrush now dominates by making up 62% of the browse cover. Sagebrush did show an increase from 1,532 plants/acre in 1982 to 6,666 in 1992, a 77% increase. Young plants were common and accounted for 64% of the population. By 1998, the population has remained comparable with a change to a more mature population. Young plants are still common, but the proportion has declined from 64% to 26%. Density of mature plants increased from 2,000 to 4,000 plants/acre. Utilization was moderate in 1982, although lighter in 1992 and 1998.

Sticky low rabbitbrush is the most abundant shrub on the site. It currently provides the majority of the shrub cover on the site. It had increased in density from 8,666 to 14,132 plants/acre between 1982 and 1992. The much larger sample used in 1998 estimated 11,140 plants/acre. Reproduction is still good, but the population is becoming increasingly mature. Most plants are not utilized.

Slenderbush eriogonum was relatively abundant in 1992, however it was not encountered in the larger sample of 1998. It is possible that there is an isolated population of slenderbush eriogonum that was sampled by the small sample in 1992, but not in 1998.

Grass is abundant, but composition consists largely of the increaser species, Letterman needlegrass, subalpine needlegrass, and needle-and-thread grass. These grasses account for 92% of the grass cover on the site. Virtually all grass plants were 30% to 50% utilized in 1982. Many of the grasses were grazed in 1992, but percent utilization was not estimated. The site was reread on July 1<sup>st</sup> of 1998 and it did not appear that cows had been on the site at that time.

Forbs are also abundant, except they consist largely of the low growing increasers like pale agoseris, common dandelion, and the poisonous silky lupine. The more palatable species, Wyoming painted cup and redroot eriogonum, have shown evidence of at least moderate use in the past. During the 1998 reading, pale agoseris and silky lupine alone produced 69% of the forb cover. Most other forbs produce less than 1/2 of 1% cover. Other, more preferred forbs are present, but in low numbers.

## 1982 APPARENT TREND ASSESSMENT

On this site, soil trend is stable or even improving. However, vegetatively there are definite problems, most coming from livestock use. Stickyleaf low rabbitbrush currently dominates the site and is increasing. The more desirable mountain big sagebrush is declining and increaser grasses, especially the needlegrass species, are quickly increasing. Forbs, which are of great importance to deer in the summer, appear to be slowly declining.

## 1992 TREND ASSESSMENT

Erosion is not evident on this site. Basal vegetative cover has increased by 12% since 1982, while percent bare ground has decreased by 56%. Trend for soil is up. The trend for browse is mixed. The key browse species, mountain big sagebrush, has increased dramatically since the last reading. It has good vigor and a low percent decadency. Slender eriogonum has also increased in density. On the downside, the increaser stickyleaf low rabbitbrush has also increased on the site and has an age structure that indicates possible continued increase, especially with continued heavy use of the herbaceous understory by livestock. Trend for browse is up slightly, but close attention should be given to stickyleaf low rabbitbrush in the future. The trend for the herbaceous understory is also up, even though it is dominated by less desirable increaser species and poisonous plants.

### TREND ASSESSMENT

soil - up

browse - up slightly

herbaceous understory - up, but dominated by increaser species

## 1998 TREND ASSESSMENT

Trend for soil is stable with abundant vegetation and litter cover. Percent bare ground increased slightly, but it is still less than 10%. Erosion is not a problem on this site. Trend for browse is stable. Density of mountain big sagebrush is comparable to 1992 estimates. The population has become more mature, yet young plants are still common. Utilization is light, vigor good, and percent decadence low at only 7%. Stickyleaf low rabbitbrush is still the most abundant shrub on the site. Density of this increaser shrub has declined slightly, although some of the difference may be due to the much larger sample size giving more accurate browse population estimates. Young plants are still common, vigor is good, and percent decadence is low at 8%. Trend for the herbaceous understory is down slightly. Sum of nested frequency of perennial grasses and forbs has declined. Nested frequency of the most common grass, Letterman needlegrass, has remained similar but frequency of subalpine needlegrass declined significantly. Nested frequency of pale agoseris, Indian paintbrush, redroot eriogonum, and silky lupine all declined significantly.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - down slightly

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 5

T y p e	Species	Nested Frequency		Quadrat Frequency			Average Cover % '08
		'02	'08	'82	'92	'98	
G	Agropyron trachycaulum	-	4	2	-	3	.09
G	Bouteloua gracilis	-	-	1	-	-	-
G	Bromus carinatus	8	7	-	2	6	.13
G	Carex spp.	7	11	-	4	4	.56
G	Poa fendleriana	3	7	1	1	4	.21

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Poa pratensis	27	20	-	10	9	.55
G	Stipa columbiana	289	*208	55	94	71	5.40
G	Stipa comata	119	112	14	44	45	2.92
G	Stipa lettermani	287	256	66	92	86	10.28
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		740	625	139	247	228	20.17
Total for Grasses		740	625	139	247	228	20.17
F	Achillea millefolium	-	7	-	-	3	.18
F	Agoseris glauca	251	*187	69	87	68	3.87
F	Antennaria rosea	3	-	1	1	-	-
F	Artemisia ludoviciana	3	-	-	1	-	-
F	Astragalus spp.	4	2	-	2	1	.03
F	Astragalus utahensis	-	6	-	-	2	.18
F	Castilleja linariaefolia	53	*23	2	24	11	.27
F	Calochortus nuttallii	-	2	9	-	1	.01
F	Chenopodium spp. (a)	-	28	-	-	11	.13
F	Collinsia parviflora (a)	-	14	-	-	6	.13
F	Crepis acuminata	-	*34	-	-	13	.34
F	Delphinium nuttallianum	-	1	-	-	1	.03
F	Epilobium paniculatum (a)	-	3	-	-	1	.00
F	Erigeron eatonii	-	1	-	-	1	.01
F	Erigeron spp.	3	2	-	2	1	.01
F	Eriogonum racemosum	4	*12	2	2	7	.30
F	Fritillaria atropurpurea	1	-	4	1	-	-
F	Galium boreale	-	13	-	-	5	.21
F	Hackelia patens	10	*28	1	6	14	.56
F	Hymenoxys acaulis	-	6	-	-	2	.01
F	Hydrophyllum occidentale	3	-	-	1	-	-
F	Lomatium spp.	-	1	-	-	1	.00
F	Lupinus sericeus	219	*86	42	92	42	3.59
F	Penstemon spp.	-	3	-	-	1	.03
F	Polygonum douglasii (a)	-	156	-	-	55	.72
F	Taraxacum officinale	32	*15	4	23	6	.22
Total for Annual Forbs		0	201	0	0	73	0.98
Total for Perennial Forbs		586	429	134	242	180	9.90
Total for Forbs		586	630	134	242	253	10.89

\* Indicates significant difference at  $\alpha = 0.10$  (annuals excluded)

BROWSE TRENDS --  
Herd unit 30 , Study no: 5

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata vaseyana	92	13.89
B	Chrysothamnus nauseosus	0	-
B	Chrysothamnus viscidiflorus viscidiflorus	96	23.36
B	Eriogonum microthecum	0	-
B	Mahonia repens	1	.06
B	Quercus gambelii	1	-
B	Populus tremuloides	0	.18
B	Ribes viscosissimum	0	-
B	Symphoricarpos oreophilus	1	.18
Total for Browse		191	37.68

#### BASIC COVER --

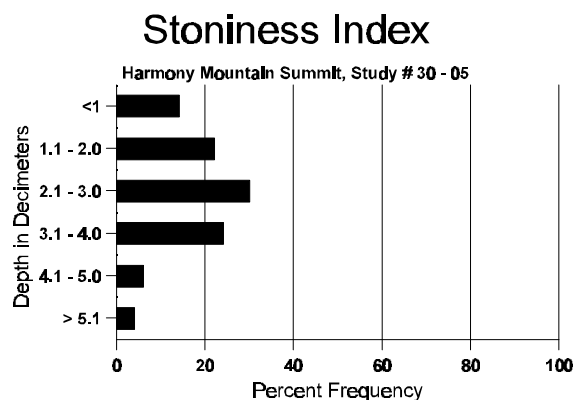
Herd unit 30 , Study no: 5

Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	377	29.00	33.00	60.90
Rock	92	0	0	2.23
Pavement	118	0	.25	1.01
Litter	395	61.75	63.25	63.82
Cryptogams	-	0	0	0
Bare Ground	174	9.25	3.50	8.60

#### SOIL ANALYSIS DATA --

Herd Unit 30, Study # 05, Study Name: Harmony Mountain Summit

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.2	47.8 (16.1)	5.4	62.0	19.4	18.6	4.5	41.9	268.8	.4



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 5

Type	Quadrat Frequency '98
Sheep	2
Deer	44
Cattle	18

# BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 5

Age		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
	Y R	1	2	3	4	5	6	7	8	9	1	2	3	4			
Artemisia tridentata vaseyana																	
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	29	-	-	-	-	-	-	-	-	27	1	1	-	1933		29
	98	40	-	-	3	-	-	1	-	-	44	-	-	-	880		44
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	62	2	-	-	-	-	-	-	-	63	-	1	-	4266		64
	98	78	-	-	1	-	-	-	-	-	79	-	-	-	1580		79
M	82	2	10	-	-	-	-	-	-	-	12	-	-	-	800	15 12	12
	92	18	11	1	-	-	-	-	-	-	29	-	1	-	2000	15 30	30
	98	193	6	-	4	-	-	-	-	-	200	2	1	-	4060	16 24	203
D	82	7	3	-	-	-	-	-	-	-	9	1	-	-	666		10
	92	5	1	-	-	-	-	-	-	-	3	-	1	2	400		6
	98	19	2	-	-	-	-	-	-	-	21	-	-	-	420		21
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12
% Plants Showing		Moderate Use			Heavy Use			Poor Vigor			%Change						
'82		57%			00%			00%			+77%						
'92		14%			01%			05%			- 9%						
'98		03%			00%			.33%									
Total Plants/Acre (excluding Dead & Seedlings)													'82	1532	Dec:	43%	
													'92	6666		6%	
													'98	6060		7%	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus nauseosus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	-	2	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	1	-	-	-	-	-	-	-	-	4	-	-	266		4	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	4	2	-	-	-	-	-	-	-	-	6	-	-	400	7	6	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		30%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	666		-			
												'98	0		-			
Chrysothamnus viscidiflorus viscidiflorus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	6	-	-	-	-	-	-	-	-	-	6	-	-	400		6	
	98	11	-	-	-	-	-	-	-	-	-	11	-	-	220		11	
Y	82	32	-	-	-	-	-	-	-	-	-	32	-	-	2133		32	
	92	51	1	-	-	-	-	-	-	-	-	50	-	2	3466		52	
	98	91	2	-	-	-	-	-	-	-	-	93	-	-	1860		93	
M	82	75	-	-	-	-	-	-	-	-	-	75	-	-	5000	12	15	
	92	122	20	3	-	-	-	-	-	-	-	142	2	1	9666	11	13	
	98	418	-	-	3	-	-	-	-	-	-	421	-	-	8420	13	21	
D	82	10	-	-	13	-	-	-	-	-	-	22	1	-	1533		23	
	92	13	2	-	-	-	-	-	-	-	-	14	-	1	1000		15	
	98	43	-	-	-	-	-	-	-	-	-	43	-	-	860		43	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+39%							
'92		11%			01%			02%			-21%							
'98		.35%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	8666	Dec:	18%			
												'92	14132		7%			
												'98	11140		8%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Eriogonum microthecum																		
Y	82	21	-	-	-	-	-	-	-	-	18	3	-	-	1400		21	
	92	87	1	-	-	-	-	1	-	-	89	-	-	-	5933		89	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	41	3	-	-	-	-	-	-	-	44	-	-	-	2933	10	12	
	92	61	4	-	-	4	-	-	-	-	66	-	3	-	4600	5	7	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
D	82	6	-	-	-	-	-	-	-	-	3	3	-	-	400		6	
	92	4	-	-	-	-	-	-	-	-	2	-	2	-	266		4	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		04%			00%			00%			+56%							
'92		06%			00%			03%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	4733	Dec:	8%			
												'92	10799		2%			
												'98	0		0%			
Mahonia repens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120	5	7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	120		-			
Populus tremuloides																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	157	106	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:			
												'92		0				
												'98		0				
Ribes viscosissimum																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	31	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:			
												'92		0				
												'98		0				
Symphoricarpos oreophilus																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	1	-	-	-	-	-	-	-	-	1	-	-	20	25	51	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			100%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:			
												'92		0				
												'98		20				

### Trend Study 30-9-98

Study site name: Upper Lime Spring .

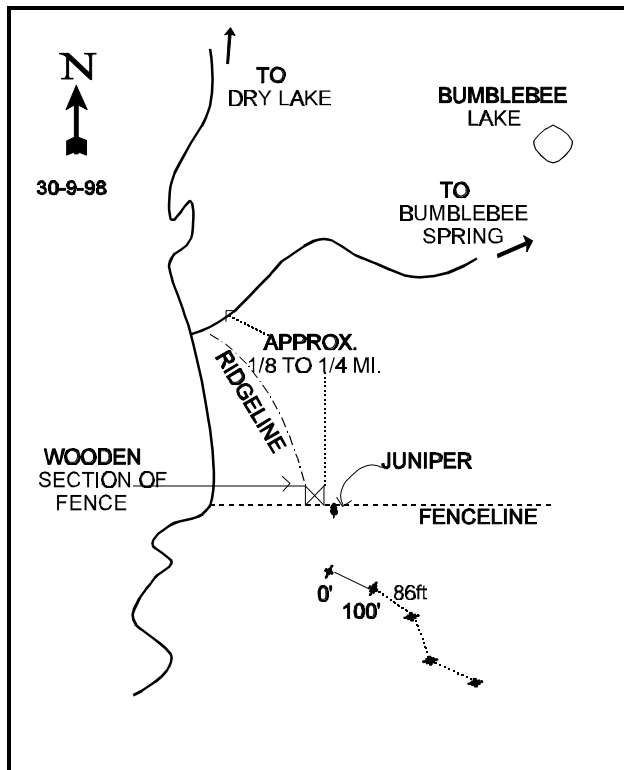
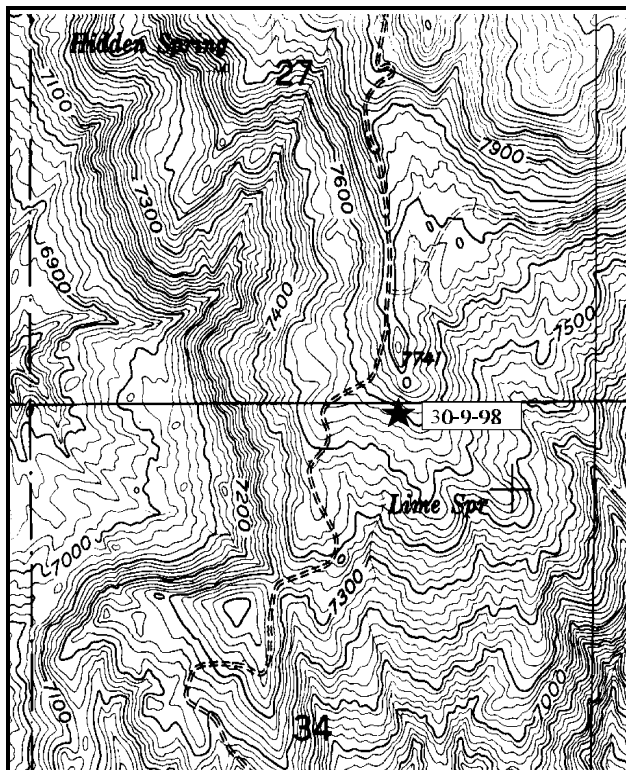
Range type: Mountain Brush .

Compass azimuth: frequency baseline 100 degrees. (Line 2 120°M, line 3 170°M, line 4 112°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (14 & 87ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

### LOCATION DESCRIPTION

From the Forest Boundary north of New Harmony, proceed north 0.3 miles on Pace Draw Road. Turn right on the Harmony Mountain Road and proceed 1.6 miles to a gate. Go through the gate 4.4 miles to the junction of Harmony Mountain Road and Bumblebee Spring Road, walk in a southeasterly direction along the top of the ridge. At the end of the ridge, walk down the slope to a barbed wire fence with one wooden section. Nearby is a lone juniper in some oakbrush. From the juniper, the 0-foot baseline stake is located 18 paces away at a bearing of 141 degrees true. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.



Map Name: Stoddard Mountain

Diagrammatic Sketch

Township 37S , Range 13W , Section 34

UTM 4157393.117 N, 297284.690 E

## DISCUSSION

### Trend Study No. 30-9 (50A-9)

The Upper Lime Spring trend study occupies an oakbrush range type on a southeast aspect with slope of approximately 10% to 15%. Elevation is about 7,600 feet. The area is considered summer fawning habitat for deer and also receives some summer cattle use. There was evidence of deer beds and abundant pellet groups during the 1982 and 1992 readings. Pellet group data from 1998 estimate 62 deer days use/acre. No sign of cattle use was observed on the site during the reading on the first of July.

Soils are limestone derived, fine textured, with some surface rockiness. Effective rooting depth (see methods) is estimated at just over 14 inches. Soil texture is a sandy clay loam with an neutral pH (6.9). Phosphorus may be limiting to plant growth at just 4.6 ppm, when 10 ppm is considered the minimum for normal plant development. The surface horizon is a light colored whitish gray soil which lacks structure. At a depth of 8 to 12 inches is a compacted orange-brown clay layer. There are numerous barren shrub interspaces which allow some erosion to occur. Areas dominated by oak clones and serviceberry have a good buildup of litter which helps protect the soil. Overall, soil erosion does not appear to be a problem.

Browse on the site is "patchy" in its distribution. Gambel oak is the most abundant species which varies in size, perhaps due to soil characteristics. Some areas are dominated by short 2 to 3 foot high oak, while more level areas have oak in the 8 to 10 foot range. Some of these taller oak clones are very dense. Density was estimated at 15,132 stems/acre in 1992. The age structure is composed mostly of young plants (68%). Vigor is generally good, yet approximately 20% of the plants encountered in 1992 had extensive insect damage. The level of utilization varied from light to heavy. In 1998, the study site baseline was lengthened in order to take a much larger sample. Density was estimated at 10,480 stems/acre. Average height is lower since more of the low growing oak was encountered in the larger sample. Most of the oak appears unutilized. Vigor is poor however, on approximately 27% of the oak, due to the cold spring weather and late frosts of 1998.

Other important browse plants are Utah serviceberry, mountain big sagebrush, and true mountain mahogany. The serviceberry and mahogany species are generally less than five feet in height and available to browsing. Utah serviceberry has increased dramatically from 4,199 in 1982 to 10,466 plants/acre by 1992 due mostly to the large number of young plants encountered in 1992. The larger sample used in 1998 estimated only 3,300 plants/acre. Vigor has improved since 1982 when insect damage was noted on over 20% of the individuals. No insect damage was encountered on serviceberry during the 1992 or 1998 readings. The proportion of heavily hedged plants also decreased from 67% in 1982 to 34% in 1992, and 12% by 1998. Reproduction remains adequate to maintain the population. True mountain mahogany occurs in limited densities of about 200 plants/acre. These shrubs are moderate to heavily hedged but in good vigor. Mountain big sagebrush has an estimated density of 400 plants/acre. They show mostly moderate use with 25% classified as decadent. Other preferred browse which occur in small numbers include: black sagebrush, cliffrose, and snowberry.

Grasses are nearly nonexistent. Indian ricegrass, needle-and-thread, and a sedge are the only species which occur on the site. These combine to produce less than 1% cover. Forbs are slightly more abundant, but still deficient. Forbs are an important element of summer fawning habitat and should be increased if possible. The principal forb species include American vetch and Leonard penstemon, which currently ('98) provide 85% of the meager forb cover (5.4%).

### 1982 APPARENT TREND ASSESSMENT

Soil movement is occurring at a moderate rate, but could be arrested if a decent herbaceous cover were to be established. Overall, soil trend is stable to declining. Vegetation trend is similar. Gambel oak density is probably increasing at a slow rate. The more preferred serviceberry may also be increasing, but will be outperformed by oak. The lack of grasses and forbs is alarming considering that this is spring and summer range for deer.

## 1992 TREND ASSESSMENT

Protective ground cover has improved since 1982. Basal vegetative cover increased by 71% and percent bare ground decreased by 60% since the last reading. However, active gullies, soil pedestaling, and surface erosion are still occurring on the site. The soil trend has improved since 1982, but a good herbaceous understory is needed to adequately protect the soil from erosion. Browse trend is up for serviceberry and stable for oak. Oak has increased in density 26%, but shows increasing insect damage (11% in 1982 to 22% in 1992) and heavy hedging (1% to 6%). Utah serviceberry has increased 60% and displays less heavy hedging (67% in 1982 to 34% in 1992). Overall, browse trend is up slightly. The trend for herbaceous understory is stable but grasses and forbs are nearly absent on this site. Only two grasses are present in small numbers and more forbs are needed in order to improve forage for summering deer.

### TREND ASSESSMENT

soil - stable since 1982, but in poor condition with erosion still occurring

browse - up slightly

herbaceous understory - stable, but nearly absent

## 1998 TREND ASSESSMENT

The soil trend appears down slightly due to an increase in percent bare ground and a decline in litter cover. The original frequency baseline sampled more oak clones which had a high cover of litter and less bare ground. The lengthened baseline used in 1998 sampled more open areas where litter cover was lower and bare shrub interspaces more abundant. With this, trend for soil is considered stable. Trend for browse is stable. Density changes are mostly due to the increased sample size which better estimates shrub densities that are very clumped distributions on this site. Serviceberry displays mostly good vigor with less heavy use compared to 1992 and low decadence. Reproduction is adequate to maintain the stand. Gambel oak density is down slightly from 1992 estimates primarily due to a decline in percentage of young plants from 10,400 to 4,860 plants/acre. Use is light but vigor reduced due to frost damage on 27% of the plants. Reproduction is good and decadence low. Trend for the herbaceous understory is stable, but depleted. Only two grass species and 1 sedge are found on the site. Forbs consist almost entirely of Leonard penstemon and American vetch. Grasses and forbs combine to produce only 6% cover.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable, but nearly absent

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 9

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Carex spp.	-	*14	-	-	6	.39
G	Oryzopsis hymenoides	7	8	1	4	5	.37
G	Stipa comata	5	-	-	3	-	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		12	22	1	7	11	0.76
Total for Grasses		12	22	1	7	11	0.76

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
F	Agoseris glauca	-	-	1	-	-	-
F	Arabis spp.	1	-	-	1	-	-
F	Astragalus spp.	-	3	-	-	1	.03
F	Calochortus nuttallii	-	3	-	-	1	.00
F	Cymopterus spp.	13	24	16	7	12	.18
F	Epilobium paniculatum (a)	-	1	-	-	1	.00
F	Erigeron eatonii	-	6	-	-	2	.03
F	Hymenopappus filifolius	3	3	1	1	1	.03
F	Hydrophyllum occidentale	-	3	-	-	1	.06
F	Lomatium spp.	-	*8	-	-	6	.10
F	Lotus utahensis	9	*-	-	5	-	-
F	Lupinus argenteus	-	*13	-	-	6	.05
F	Pedicularis centranthera	3	5	2	2	3	.07
F	Penstemon leonardi	26	*49	35	10	24	2.00
F	Penstemon linarioides	44	*-	-	19	-	-
F	Phlox austromontana	2	3	-	1	1	.00
F	Physaria chambersii	3	-	-	1	-	-
F	Phlox longifolia	3	*20	-	3	7	.03
F	Senecio multilobatus	15	*4	1	8	3	.06
F	Taraxacum officinale	-	-	1	-	-	-
F	Trifolium spp.	3	*22	2	2	9	.11
F	Vicia americana	131	*69	45	56	23	2.60
F	Viguiera multiflora	-	-	-	-	-	.00
F	Zigadenus paniculatus	-	2	-	-	2	.01
Total for Annual Forbs		0	1	0	0	1	0.00
Total for Perennial Forbs		256	237	104	116	102	5.43
Total for Forbs		256	238	104	116	103	5.43

\* Indicates significant difference at % = 0.10 (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 9

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	55	13.83
B	Artemisia nova	2	.38
B	Arctostaphylos patula	22	9.05
B	Artemisia tridentata vaseyana	9	1.78
B	Cercocarpus montanus	9	2.12
B	Chrysothamnus viscidiflorus	3	.15
B	Cowania mexicana stansburiana	1	.15
B	Gutierrezia sarothrae	1	.00
B	Juniperus osteosperma	1	-
B	Mahonia repens	13	.30
B	Pinus edulis	1	-
B	Quercus gambelii	65	21.56
B	Symphoricarpos oreophilus	2	1.00
B	Tetradymia canescens	5	.16
Total for Browse		189	50.55

## CANOPY COVER --

Herd unit 30 , Study no: 9

Species	Percent Cover '98
Amelanchier utahensis	.40
Quercus gambelii	9

## BASIC COVER --

Herd unit 30 , Study no: 9

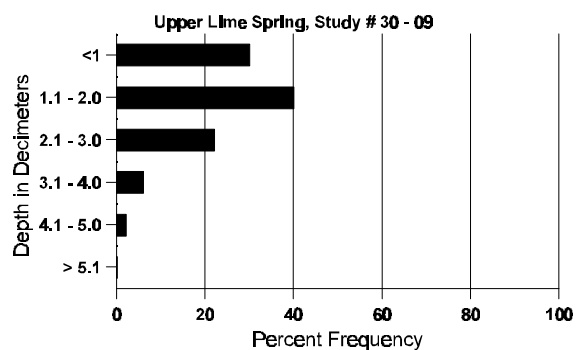
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	279	2.00	6.50	54.00
Rock	89	2.00	1.25	2.33
Pavement	197	0	4.50	10.53
Litter	392	71.25	78.75	66.71
Cryptogams	1	0	0	.00
Bare Ground	196	24.75	10.25	14.26

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 09, Study Name: Upper Lime Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.4	51.6 (19.4)	6.9	46.0	21.4	32.6	2.4	4.6	83.2	.7

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 9

Type	Quadrat Frequency '98
Rabbit	2
Deer	9

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 9

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Amelanchier utahensis																	
S	82	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1
	92	3	-	-	3	-	-	5	-	-	11	-	-	-	733		11
	98	4	1	-	4	-	-	6	-	-	14	1	-	-	300		15
Y	82	1	1	3	-	-	-	3	-	-	6	2	-	-	533		8
	92	3	7	1	25	4	-	30	-	-	70	-	-	-	4666		70
	98	16	4	2	5	1	-	7	-	-	35	-	-	-	700		35
M	82	1	-	7	-	7	28	6	-	-	40	9	-	-	3266	27 23	49
	92	2	6	2	1	19	37	-	-	2	69	-	-	-	4600	32 24	69
	98	29	35	13	10	8	4	8	-	-	105	-	2	-	2140	32 34	107
D	82	-	-	-	-	-	4	2	-	-	2	4	-	-	400		6
	92	5	-	-	-	-	3	2	-	8	9	-	-	9	1200		18
	98	10	12	1	-	-	-	-	-	-	12	-	-	11	460		23
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'82		13%			67%			00%			+60%						
'92		23%			34%			06%			-68%						
'98		36%			12%			08%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	4199	Dec:	10%		
												'92	10466		11%		
												'98	3300		14%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia nova																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	1	-	-	-	-	-	-	2	-	-	-	40	14	21	2
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		33%			33%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	60		33%			
Arctostaphylos patula																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	29	-	-	-	-	-	-	-	-	29	-	-	-	966			29
	98	-	-	-	5	-	-	-	-	-	5	-	-	-	100			5
M	82	28	-	-	-	-	-	-	-	-	24	4	-	-	1866	20	16	28
	92	17	1	-	-	-	-	-	-	-	18	-	-	-	1200	27	30	18
	98	30	-	-	14	-	-	-	-	-	43	-	1	-	880	24	88	44
D	82	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	92	24	-	-	-	-	-	-	-	-	24	-	-	-	1600			24
	98	1	-	-	1	-	-	-	-	-	1	-	-	1	40			2
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+49%							
'92		01%			00%			00%			-73%							
'98		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1932	Dec:	3%			
												'92	3766		42%			
												'98	1020		4%			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total								
		1	2	3	4		1	2									
Artemisia tridentata vaseyana																	
M	82	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	92	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
	98	6	9	-	-	-	-	-	-	-	15	-	-	18	25	15	
D	82	-	-	-	-	-	-	-	-	-	-	0			0		
	92	-	-	-	-	-	-	-	-	-	-	0			0		
	98	4	1	-	-	-	-	-	-	-	4	-	-	100		5	
X	82	-	-	-	-	-	-	-	-	-	-	0			0		
	92	-	-	-	-	-	-	-	-	-	-	0			0		
	98	-	-	-	-	-	-	-	-	-	-	80			4		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'82		00%		00%		00%											
'92		00%		00%		00%											
'98		50%		00%		05%											
Total Plants/Acre (excluding Dead & Seedlings)											'82	0	Dec:	0%			
											'92	0		0%			
											'98	400		25%			
Cercocarpus montanus																	
S	82	-	-	-	-	-	-	-	-	-	-	0			0		
	92	1	-	-	-	-	-	-	-	-	1	-	-	33	1		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	0		
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	66	1		
	92	-	-	-	1	-	-	-	-	-	1	-	-	66	1		
	98	1	-	-	-	-	-	-	-	-	1	-	-	20	1		
M	82	-	2	-	-	-	-	-	-	-	2	-	-	133	29	18	2
	92	-	1	-	2	-	1	-	-	-	4	-	-	266	36	49	4
	98	-	2	4	-	2	-	-	-	-	8	-	-	160	49	58	8
D	82	-	-	-	-	-	-	-	-	-	-	0			0		
	92	-	-	-	-	-	-	-	-	-	-	0			0		
	98	1	-	-	-	-	-	-	-	-	1	-	-	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	0			0		
	92	-	-	-	-	-	-	-	-	-	-	0			0		
	98	-	-	-	-	-	-	-	-	-	-	40			2		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>									
'82		67%		00%		00%		+40%									
'92		20%		20%		00%		-40%									
'98		40%		40%		00%											
Total Plants/Acre (excluding Dead & Seedlings)											'82	199	Dec:	0%			
											'92	332		0%			
											'98	200		10%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	1	-	-	-	-	-	-	3	-	-	-	60	8	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	60		-			
Cowania mexicana stansburiana																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			
Gutierrezia sarothrae																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	-	3	-	-	-	100		3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	-	2	-	-	-	40	7	11
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			-60%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	100		-			
												'98	40		-			
Juniperus osteosperma																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y G R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Mahonia repens																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	28	-	-	-	-	-	14	-	-	42	-	-	-	1400		42	
	98	15	-	-	2	-	-	-	-	-	17	-	-	-	340		17	
M	82	11	-	-	-	-	-	-	-	-	11	-	-	-	733	4	5	
	92	1	-	-	-	-	-	2	-	-	3	-	-	-	200	7	4	
	98	18	-	-	6	-	-	11	-	-	35	-	-	-	700	3	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+54%							
'92		00%			00%			00%			-35%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	733	Dec:	-			
												'92	1600		-			
												'98	1040		-			
Pinus edulis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	82	4	-	1	-	-	-	9	-	-	13	1	-	-	933		14	
	92	7	-	-	-	-	-	4	-	-	9	3	-	-	733		11	
	98	22	-	-	14	-	-	10	-	-	43	-	3	-	920		46	
Y	82	61	-	1	-	-	-	6	-	-	68	-	-	-	4533		68	
	92	56	58	4	13	7	-	12	6	-	108	44	4	-	10400		156	
	98	179	-	-	29	-	-	35	-	-	220	-	23	-	4860		243	
M	82	59	-	-	1	-	-	14	23	-	78	19	-	-	6466	72 34	97	
	92	5	-	1	-	10	-	-	42	-	58	-	-	-	3866	94 43	58	
	98	172	-	6	28	-	-	14	1	-	155	-	66	-	4420	41 24	221	
D	82	-	-	-	1	-	-	1	1	-	2	1	-	-	200		3	
	92	-	1	2	-	2	5	1	-	2	8	4	1	-	866		13	
	98	57	-	-	2	-	-	1	-	-	8	-	38	14	1200		60	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1220		61	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			.59%			00%			+26%							
'92		34%			06%			02%			-31%							
'98		00%			01%			27%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	11199	Dec:	2%			
												'92	15132		6%			
												'98	10480		11%			
Symphoricarpos oreophilus																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	3	-	-	-	-	-	3	-	-	-	60	20 17	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	60		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Tetradymia canescens																	
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20	1
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	-	60	3
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	4	5	-	-	-	-	-	-	-	-	9	-	-	-	180	9 15 9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'82		00%			00%			00%									
'92		00%			00%			00%									
'98		42%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-		
												'92	0		-		
												'98	240		-		

### Trend Study 30-12-98

Study site name: Pintura Bench .

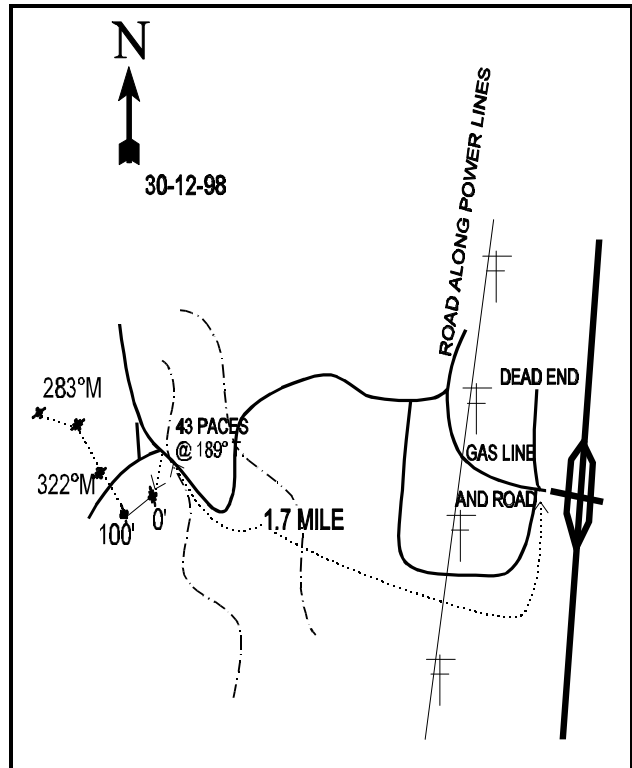
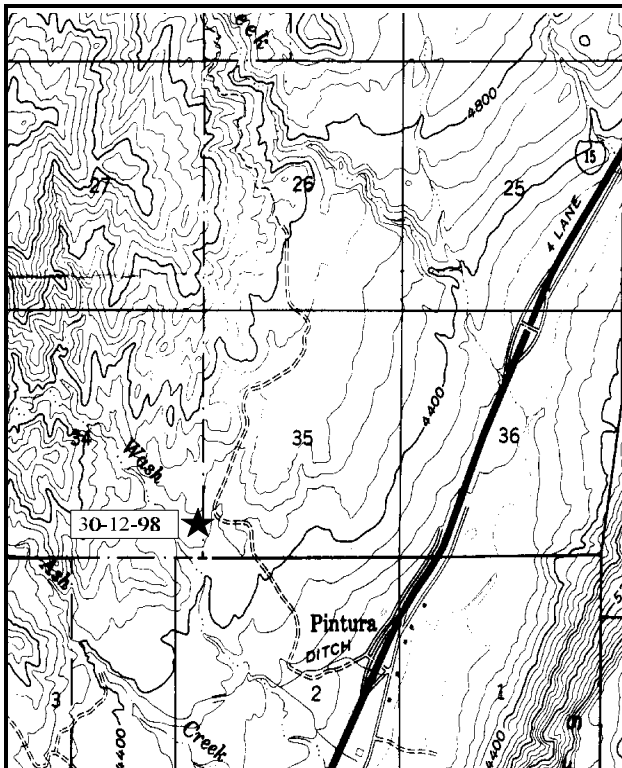
Range type: Mountain Brush .

Compass azimuth: frequency baseline 240 M degrees. (Line 2 & 3 322°M, line 4 283°)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (4 & 98ft), line 2 (56ft), line 3 (39ft), line 4 (65ft).

### LOCATION DESCRIPTION

Take the Pintura exit (#31) off Interstate 15 between Cedar City and St. George. Proceed west on the dirt road for 1.7 miles, at which point you will pass over an intermittent streambed. From the intersection of the streambed and the road, walk 43 paces at a bearing of 189 degrees true, at which point the 0-foot baseline stake will be located. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.



Map Name: New Harmony

Diagrammatic Sketch

Township 39S , Range 13W , Section 34

UTM 4135955.053 N, 297253.060 E

## DISCUSSION

### Trend Study No. 30-12 (50A-12)

The Pintura Bench study is on winter range located on an old 1960's chained and seeded juniper-pinyon area. Elevation of the study site is 4,800 feet. Terrain slopes gently (10% to 15%) to the east. It was a known concentration area for wintering deer, in which some used to migrate from the Zion unit by crossing the I-15 freeway. A new deer fence was constructed along the freeway in 1990 and 1991, which now prohibits such movement. According to Beal (1996), some mixing of the deer herds occurred between the adjacent Zion and East Pine Valley herd units before the fence was completed, but that no longer occurs. There are places where deer can still cross I-15 by way of overpasses and funnel fences between New Harmony and St. George. Pellet group data from 1998 show a low amount of deer use at 12 deer days use/acre. Cattle sign was also noted with 2 cow days use/acre.

Soils are moderately shallow and rocky with considerable amounts of bare soil and erosion pavement. Effective rooting depth (see methods) is estimated at 14 inches. Soil texture is a clay loam with a neutral pH (7.1). Phosphorus may be limiting to plant development at just 4.6 ppm, when 10 ppm is considered the minimum for normal plant development. The soil is extremely rocky throughout the profile. Calcium carbonate deposits occur on the surface of most of the rocks. Rock and pavement are also common on the surface where they currently provide 37% ground cover. Litter cover is fair and occurs mainly under tree and shrub canopies. Most of the chaining litter has decomposed with the passage of time. Erosion is light to moderate, primarily because of gentle terrain.

Density of desirable browse plants is rather low. The key species are mountain big sagebrush, Utah serviceberry, and desert ceanothus. Total density for these species is currently ('98) only 1,000 plants/acre. Utilization of sagebrush and desert ceanothus has been light to moderate since 1982, but Utah serviceberry displayed moderate and heavy use in 1982 and 1992. All plants sampled in 1998 appeared only lightly utilized. Vigor of these preferred shrubs is good and decadence is currently low. Other shrubs which provide some additional forage include: Stansbury cliffrose, green ephedra, bitterbrush, shrub live oak and slenderbush eriogonum.

The most numerous shrub is broom snakeweed which increased from 4,532 plants/acre in 1982 to 8,732 by 1992, a 48% increase. Age class evaluation indicated a dynamic expanding population with a biotic potential of 36% and young plants accounting for 91% of the population. However, by 1998 the population declined 51% and now has a similar density to that of 1982 (4,532 to 4,300 plants/acre). Age class analysis indicates a stable population with 92% of the stand consisting of mature plants.

Trees are increasing in size. Data from the point quarter method estimate 41 pinyon and 57 juniper trees/acre in 1992, the majority of which are over 4 feet in height. Point quarter data from 1998 estimate 63 singleleaf pinyon pine and 51 juniper trees/acre. Average basal diameter is 4 inches for pinyon and 4.5 inches for juniper. Most trees are now 8 to 10 feet in height.

Perennial grasses and forbs are sparse. Bottlebrush squirreltail, intermediate, and crested wheatgrass are occasionally present. Cheatgrass brome was very common in 1982, but analysis of photos and notes taken during the 1992 reading indicate that cheatgrass was not prevalent. Annual grasses and forbs were included in the 1998 sample. Cheatgrass and foxtail brome currently account for 99% of the grass cover on the site. These grasses occur in patches and are not particularly widespread. All grasses combined produce only 10% cover. No utilization of grasses was observed. Perennial forbs are slightly more common than perennial grasses. Skunk breadroot is the only perennial forb of any significance. It currently provides 85% of the meager forb cover (4%). Forbs, like grasses, are essentially ungrazed.

### 1982 APPARENT TREND ASSESSMENT

Range condition is poor and shows few signs of improvement. Over the long term, a small increase in forage production from the key species may be realized, but it is unlikely to be significant in the context of management. The increase of broom snakeweed and narrowleaf Yerba-santa is much more significant. Vegetative trend is stable or slightly declining. Soil trend is stable but at a low condition rating.

### 1992 TREND ASSESSMENT

This site is still in poor condition. The soil trend is down slightly. Even though bare ground declined from 33% to 18% since 1982, basal vegetative cover also declined, while pavement and rock cover combined doubled. Trend for browse is mixed. The key browse species, mountain big sagebrush and Utah serviceberry, have declined in numbers since the last reading. Percent decadency of Mountain big sagebrush has also increased from zero in 1982, to 67% in 1992. Desert ceanothus has increased in density 31% and has an age class structure of an expanding population. The increaser, broom snakeweed, has also increased significantly since 1982 and has a dynamic reproductive potential. Trend for browse is slightly down. Herbaceous plants are severely lacking. Quadrat frequency of perennial grasses and forbs has declined since 1982, indicating a downward trend.

#### TREND ASSESSMENT

soil - down slightly and in poor condition

browse - down slightly

herbaceous understory - down and in poor condition

### 1998 TREND ASSESSMENT

Trend for soil appears stable compared to 1992. Percent bare ground declined slightly but litter cover also declined and rock/pavement cover increased slightly. Some localized erosion is still occurring on the site, but the gentle terrain combined with the protective ground cover limit its effects. Trend for browse is up slightly for the key species, serviceberry, mountain big sagebrush, and desert ceanothus. Density estimates have changed slightly, yet some of the difference may be due to the larger sample used in 1998. Overall however, vigor is good, utilization lighter, and percent decadence lower. Density of broom snakeweed declined 51% since 1992, but rabbitbrush increased 88% from 332 to 2,680 plants/acre. Trend for the herbaceous understory is down and in very poor condition. Quadrat frequency of perennial grasses is just 5%, but sum of nested frequency is similar to 1992 estimates. Sum of nested frequency of perennial forbs declined 67% and both of the most abundant forbs, fendler Euphorbia and skunk breadroot, declined significantly in nested frequency.

#### TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - down and in poor condition

HERBACEOUS TRENDS --  
Herd unit 30 , Study no: 12

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	2	4	2	1	1	.00
G	Agropyron intermedium	-	1	8	-	1	.00
G	Bromus rubens (a)	-	92	-	-	35	1.45
G	Bromus tectorum (a)	-	306	-	-	92	8.21
G	Poa spp.	3	-	-	2	-	-
G	Sitanion hystrix	9	8	22	7	3	.04
G	Stipa lettermani	-	-	1	-	-	-
G	Vulpia octoflora (a)	-	36	-	-	13	.09
Total for Annual Grasses		0	434	0	0	140	9.75
Total for Perennial Grasses		14	13	33	10	5	0.05
Total for Grasses		14	447	33	10	145	9.80
F	Astragalus spp.	-	2	-	-	1	.03
F	Calochortus nuttallii	-	3	-	-	2	.01
F	Chaenactis douglasii	1	-	-	1	-	-
F	Cryptantha spp.	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	27	-	-	12	.13
F	Draba spp. (a)	-	82	-	-	36	.36
F	Eriogonum cernuum (a)	-	2	-	-	1	.00
F	Euphorbia fendleri	16	*1	16	11	1	.00
F	Gilia spp. (a)	-	1	-	-	1	.00
F	Lepidium spp. (a)	-	8	-	-	3	.01
F	Melilotus officinalis	3	-	10	2	-	-
F	Microsteris gracilis (a)	-	1	-	-	1	.00
F	Pediomelium mephiticum	23	*8	-	18	5	3.52
F	Penstemon spp.	6	2	1	3	1	.03
Total for Annual Forbs		0	121	0	0	54	0.52
Total for Perennial Forbs		49	16	27	35	10	3.60
Total for Forbs		49	137	27	35	64	4.13

\* Indicates significant difference at % = 0.10 (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 12

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	4	1.48
B	Arctostaphylos patula	2	.63
B	Artemisia tridentata vaseyana	13	1.54
B	Ceanothus greggii	25	2.25
B	Chrysothamnus viscidiflorus	48	6.94
B	Cowania mexicana stansburiana	1	.56
B	Ephedra viridis	5	1.66
B	Eriodictyon angustifolium	0	-
B	Eriogonum microthecum	44	2.36
B	Gutierrezia sarothrae	52	2.57
B	Juniperus osteosperma	1	1.00
B	Pinus monophylla	7	3.13
B	Prunus fasciculata	0	-
B	Purshia tridentata	0	-
B	Quercus turbinella	8	2.82
B	Rhus trilobata trilobata	6	1.51
B	Yucca baccata	1	-
Total for Browse		217	28.52

## CANOPY COVER --

Herd unit 30 , Study no: 12

Species	Percent Cover '98
Juniperus osteosperma	.60
Pinus monophylla	4

## BASIC COVER --

Herd unit 30 , Study no: 12

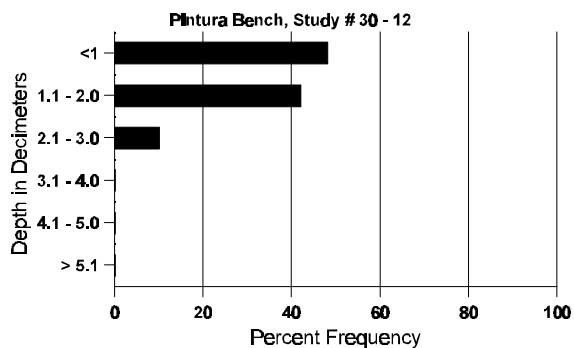
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	346	2.50	1.00	39.40
Rock	277	2.75	11.25	15.23
Pavement	327	11.75	22.25	21.93
Litter	381	49.75	47.25	39.86
Cryptogams	21	0	0	.09
Bare Ground	250	33.25	18.25	15.88

# SOIL ANALYSIS DATA --

Herd Unit 30, Study # 12, Study Name: Pintura Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.0	49.4 (17.8)	7.1	42.0	29.4	28.6	3.5	4.6	76.8	.6

## Stoniness Index



# PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 12

Type	Quadrat Frequency '98
Rabbit	18
Deer	19

# BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 12

Site Unit 88, Study No. 12																			
A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Amelanchier utahensis																			
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2	
M	82	-	2	2	-	-	-	-	-	-	4	-	-	-	266	28	30	4	
	92	-	-	1	-	1	-	-	-	-	2	-	-	-	133	69	45	2	
	98	5	-	-	-	-	-	-	-	-	2	3	-	-	100	64	61	5	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'82		50%				50%				00%				-50%					
'92		50%				50%				00%				+ 5%					
'98		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)														'82	266	Dec:	-		
														'92	133		-		
														'98	140		-		
Arctostaphylos patula																			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	33	61	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			
Artemisia tridentata vaseyana																		
S	82	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	82	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133	32	26	2
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	9	1	1	1	1	-	-	-	-	13	-	-	-	260	22	32	13
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		33%			00%			00%			+ 0%							
'92		100%			00%			00%			+34%							
'98		13%			07%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	199	Dec:	0%			
												'92	199		67%			
												'98	300		13%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ceanothus greggii																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	2	-	-	3	-	-	6	-	-	-	120		6	
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	-	-	-	1	1	-	-	-	-	2	-	-	-	133		2	
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
M	82	7	-	-	-	-	-	-	-	-	7	-	-	-	466	25	31	7
	92	-	3	2	-	4	-	-	-	-	9	-	-	-	600	32	44	9
	98	5	9	5	2	2	-	-	-	-	23	-	-	-	460	28	47	23
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	1	-	-	-	-	-	2	-	-	-	133		2	
	98	1	-	-	1	-	-	-	-	-	1	-	-	1	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+31%							
'92		62%			23%			00%			-35%							
'98		39%			18%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	599	Dec:	0%			
												'92	866		15%			
												'98	560		7%			
Chrysothamnus viscidiflorus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	98	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	66	9	5	1
	98	96	-	-	4	-	-	-	-	-	100	-	-	-	2000	17	28	100
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	20	1	-	-	-	-	-	-	-	14	-	-	7	420		21	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+88%							
'98		.74%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	332		0%			
												'98	2680		16%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cowania mexicana stansburiana																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	1	-	-	-	-	-	-	-	-	-	1	-	20	56	39	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			100%			00%			100%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			
Ephedra viridis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	3	-	-	-	-	-	-	-	-	3	-	-	60			3	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	3	-	-	1	-	-	-	-	-	4	-	-	80	31	34	4	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	160		13%			
Eriodictyon angustifolium																		
S	82	13	-	-	-	-	-	-	-	-	13	-	-	866			13	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	82	10	-	-	-	-	-	-	-	-	10	-	-	666			10	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	82	14	-	-	-	-	-	-	-	-	14	-	-	933	20	17	14	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	1599	Dec:	-			
												'92	0		-			
												'98	0		-			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Eriogonum microthecum																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	9	-	-	-	-	-	-	-	-	-	-	-	-	600		9	
	98	1	-	-	-	-	-	-	1	-	-	-	-	-	40		2	
Y	82	1	-	-	-	-	-	-	-	-	-	-	-	-	66		1	
	92	5	1	-	-	-	-	-	-	-	-	-	-	-	400		6	
	98	17	-	-	1	-	-	-	1	-	-	-	-	-	380		19	
M	82	4	-	-	-	-	-	-	-	-	-	-	-	-	266	12	14	
	92	3	2	-	-	1	-	-	-	-	1	-	-	-	466	10	10	
	98	93	-	-	22	-	-	-	2	-	-	-	-	-	2340	17	27	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	2	-	1	-	1	-	-	-	-	-	-	-	266		4	
	98	4	-	-	1	-	-	-	-	-	-	-	-	3	100		5	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+71%							
'92		35%			12%			00%			+60%							
'98		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	332	Dec:	0%			
												'92	1132		23%			
												'98	2820		4%			
Gutierrezia sarothrae																		
S	82	3	-	-	-	-	-	-	-	-	-	-	-	-	200		3	
	92	73	-	-	-	-	-	-	-	-	-	-	-	-	4866		73	
	98	5	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
Y	82	26	-	-	-	-	-	-	-	-	-	-	-	-	1733		26	
	92	119	-	-	-	-	-	-	-	-	-	-	-	-	7933		119	
	98	16	-	-	1	-	-	-	1	-	-	-	-	-	360		18	
M	82	41	-	-	-	-	-	-	-	-	-	-	-	-	2733	11	11	
	92	11	-	-	-	-	-	-	-	-	-	-	-	-	733	9	9	
	98	195	-	-	-	1	-	-	1	-	-	-	-	-	3940	8	10	
D	82	1	-	-	-	-	-	-	-	-	-	-	-	-	66		1	
	92	1	-	-	-	-	-	-	-	-	-	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+48%							
'92		00%			00%			00%			-51%							
'98		.46%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	4532	Dec:	1%			
												'92	8732		1%			
												'98	4300		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	67	74	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66	118	100	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			00%			00%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	-			
												'92	66		-			
												'98	20		-			
Pinus monophylla																		
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133			
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	66			
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	67	47	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	133	82	68	
	98	3	-	-	-	-	-	1	-	-	4	-	-	-	80	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		33%			00%			00%			-30%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	199	Dec:	-			
												'92	199		-			
												'98	140		-			
Prunus fasciculata																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	43	69	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	42	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:		-	
												'92		0			-	
												'98		0			-	
Quercus turbinella																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	1	-	-	-	-	-	-	4	-	-	266			4
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
Y	82	1	-	-	-	-	-	-	-	-	-	1	-	-	66			1
	92	1	-	-	-	2	-	1	-	-	-	4	-	-	266			4
	98	1	-	-	1	-	-	-	-	-	-	2	-	-	40			2
M	82	2	-	-	-	-	-	-	-	-	-	2	-	-	133	37	26	2
	92	1	-	-	-	1	-	-	-	-	-	2	-	-	133	31	23	2
	98	15	-	-	-	3	-	-	-	-	-	18	-	-	360	46	60	18
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	1	-	-	-	-	-	-	-	-	1	-	-	66			1
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			+57%							
		'92			57%			00%			- 1%							
		'98			13%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		199	Dec:		0%	
												'92		465			14%	
												'98		460			13%	
Rhus trilobata trilobata																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	1	-	-	1	-	-	-	2	-	-	40			2
M	82	-	1	-	-	-	-	-	-	-	-	1	-	-	66	47	41	1
	92	-	1	-	-	-	-	-	-	-	-	1	-	-	66	50	51	1
	98	8	-	-	1	-	-	-	-	-	-	9	-	-	180	49	93	9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			100%			00%			+ 0%							
		'92			100%			00%			+70%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		66	Dec:		-	
												'92		66			-	
												'98		220			-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Yucca baccata																		
M	'82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	33	42	2
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
		'82				00%				00%				00%				
		'92				00%				00%				00%				
		'98				00%				00%				00%				
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			

### Trend Study 30-13-98

Study site name: Black Ridge .

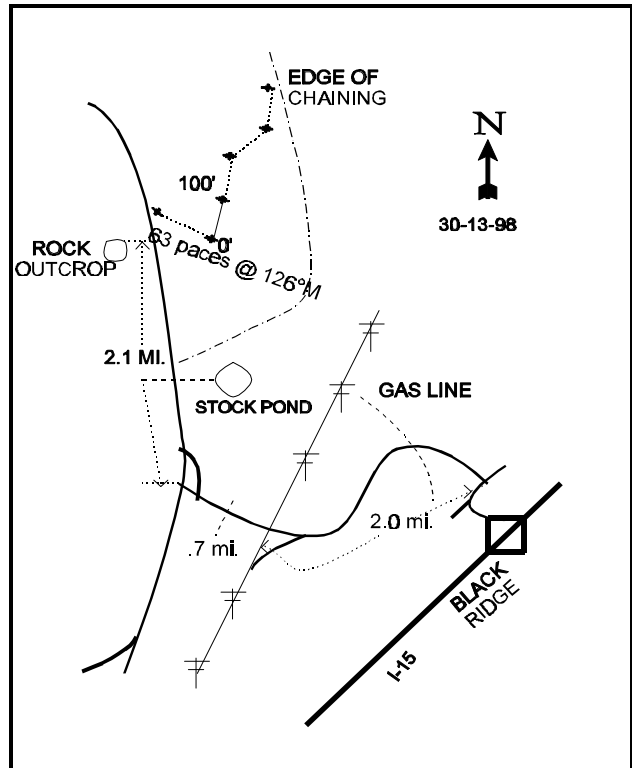
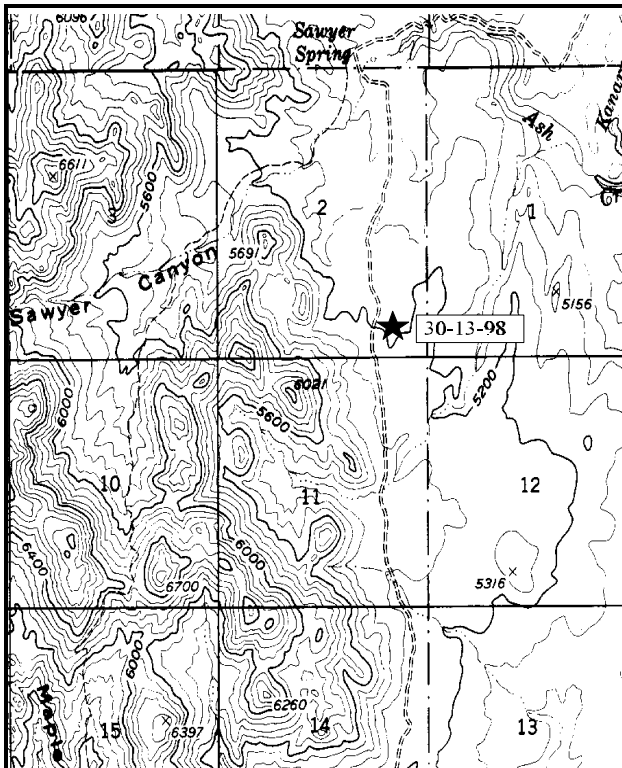
Range type: Chained, Reseeded P-J .

Compass azimuth: frequency baseline 2 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (15 & 84ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

### LOCATION DESCRIPTION

Traveling south on Freeway I-15 from Cedar City, take the Black Ridge exit (exit #36). Go west for a short distance to a frontage road. Turn north on the frontage road and then take the first left turn heading west. Travel approximately 2.0 miles on this road, disregarding minor turnoffs. At this point, you will come to an intersection at the power lines. Take the road to the right. Proceed on this road for another 0.7 miles, at which point there will be another intersection. Turn right at the intersection and travel 2.1 miles, then stop. On the left side of the road is a large rock outcrop. On the right side of the road is a witness post. The 0-foot baseline stake is located 63 paces at a bearing of 126 degrees magnetic from the witness post. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height. The 0-foot baseline stake is marked with a browse tag number 7003.



Map Name: New Harmony

Diagrammatic Sketch

Township 39S , Range 13W , Section 2

UTM 4143873.291 N, 298732.700 E

## DISCUSSION

### Trend Study No. 30-13 (50A-13)

The Black Ridge big game range trend study is located on a chained and seeded pinyon-juniper site slightly north of the Great Basin-Colorado River divide on Black Ridge. Elevation is approximately 5,200 feet, with a 8-10% slope and a north to northeast aspect. This area is critical winter range for deer, but currently receives little use because of low deer populations in the area. Cattle were observed in the area during the 1992 reading. About 40 cattle utilize this chaining between June 1st and September 30th on alternating years. Pellet group data taken on the site in 1998 estimate 21 deer days use/acre. No sign of cattle was encountered within the vicinity of the transect.

Soils are igneous in origin, dark-colored, shallow in places and very rocky. Surface temperatures would likely be high during the summer, especially on the south and west aspects. The soil is actually quite deep once you get past the rocks. Effective rooting depth (see methods) is estimated at 24 inches. Soil texture is a clay loam with a moderately acid pH (6.0). Phosphorus may be limiting to plant growth at just 4.2 ppm, when 10 ppm is considered to be the minimum for normal plant development. There is noticeable erosion as evidenced by the presence of active gullies and fairly extensive areas of rock and erosion pavement. Erosion appears to be controlled since the chaining treatment. Protective ground cover is abundant leaving little bare soil exposed.

During the 1982 reading, browse was not as abundant on the site. Mountain big sagebrush and Utah serviceberry were the most common at 599 and 333 plants/acre respectively. Mountain big sagebrush increased 94% by 1992 to 10,199 plants/acre. Seedlings were abundant with a biotic potential of 35% and young plants accounted for 61% of the population. The much larger sample used in 1998 estimated 6,080 plants/acre. The change in density would come mostly from the young age class which declined from 6,266 to 1,940 plants/acre. Density of mature plants remained comparable. Seedlings are still abundant, but many will likely not survive. Sagebrush on the site appears to be a hybrid between black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata vaseyana*). In 1992, both black and mountain big sagebrush were classified. These species have since been combined into mountain big sagebrush. It shows light to moderate use, good vigor, and low decadence.

Serviceberry has increased from 333 to 1,140 plants/acre between 1982 and 1998. Mature shrubs now average nearly 4 feet in height. Utilization is light to moderate. Another preferred species, antelope bitterbrush, also occurs in limited numbers. It shows moderate use. Small populations of Gambel and shrub-live oak also inhabit the site. The increaser, broom snakeweed, appeared in the density plots for the first time in 1992. Density was estimated at 2,066 plants/acre with an equal number of seedlings. By 1998, the number of broom snakeweed increased to 3,240 plants/acre. The population is now mostly mature.

Juniper and pinyon trees are abundant. Point quarter data from 1992 estimated 238 juniper and 12 pinyon trees/acre. Over half of these were between 4 and 8 feet in height. Density strip data estimates similar tree densities between 1992 and 1998. Most of the mature junipers in 1998 were in the 8 to 12 foot tall range, with an overhead canopy cover estimated at 5%.

Seeded and native grasses are well established on the site. Crested wheatgrass dominates with lesser amounts of mutton bluegrass and prairie junegrass. Forbs are diverse, although not particularly numerous. Fourteen species of forbs were inventoried on the site during the 1992 reading. Yellow sweetclover was the only seeded forb encountered. The most abundant native perennials encountered in 1992 included showy goldeneye and sulfur eriogonum. Twelve additional annual and perennial forbs were encountered during the 1998 reading. Photos and quadrat frequency data from the 1982 reading suggest that grasses were less numerous but larger and more robust than those of 1992. Quadrat frequency of grasses increased significantly in 1992, but the grasses are smaller. Photos also suggest that juniper has increased significantly in size since

the first reading. Since this area only receives light cattle use, these changes in grass frequency and production are likely the result of drought combined with increased competition from shrubs and trees. Rain gauge data taken by the BLM (Laney 1996) indicate a normal average of almost 18 inches of precipitation annually. Total annual precipitation measured only 6.4 inches in 1984. From 1983 to 1992, annual precipitation was below average five of the nine years. Precipitation falling in the spring (March through May) is critical for cool season herbaceous species. The Black Ridge site receives on average, 6.36 inches of precipitation or 35% of the total annual precipitation during this period. The spring periods of 1984, 1985, and 1989 were particularly dry, averaging only 38% of normal. Spring precipitation was on average 81% of normal in 1986, 1990, and 1991. Spring precipitation was above normal in 1992.

#### 1982 APPARENT TREND ASSESSMENT

Soil trend is likely slowly improving as the site becomes progressively more densely vegetated. There is soil movement and active gully formation, but this appears to be stabilizing. Vegetative trend is more difficult to gauge. The three key browse species appear to be expanding, but may be inhibited somewhat by the more rapid expansion and growth of crested wheatgrass and Utah juniper. The abundance of broom snakeweed should also be closely monitored.

#### 1992 TREND ASSESSMENT

Soil trend is slightly down. Basal vegetative cover dropped 44% since 1982, while bare ground increased slightly. Litter cover also declined from 57% to 44%, likely due to the decrease in grass litter buildup. The browse trend has improved with increased densities of mountain big sagebrush. However, the density of broom snakeweed also increased and has an age class structure indicating an expanding population. The herbaceous trend is difficult to determine by looking solely at the data. Quadrat frequency of both grasses and forbs have increased. However, by looking at the photos it is apparent that grasses have declined in size and vigor likely due to drought. If this trend continues it will result in a shrub and tree dominated system. Trend for herbaceous understory is therefore, slightly down.

##### TREND ASSESSMENT

soil - slightly down

browse - up

herbaceous understory - down slightly

#### 1998 TREND ASSESSMENT

Trend for soil is stable since 1992. Percent bare ground declined slightly but litter cover is also reduced. Rock and pavement cover increased from 41% to 52%. However, soil erosion appears to be under control. Trend for the key browse species, mountain big sagebrush and serviceberry, appear stable. Density of sagebrush has declined due to a reduction in young plants which were very abundant in 1992. Density of mature plants has remained similar between readings. There are still ample seedlings and young to maintain the population. Utilization is mostly light and vigor good. Percent decadence has increased, but it is still relatively low at 11%. Density of serviceberry has increased, although much of the change would be due to the much larger sample used in 1998 now giving more accurate estimates for shrubs. Utilization is light, vigor good, and young plants account for 33% of the population. Broom snakeweed has increased 36% since 1992, but the current population is mostly mature. Juniper density is similar to 1992 estimates, while trees have greatly increased in size. Currently, overhead canopy cover averages 5%. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has remained steady, even though frequency of perennial forbs has increased. Overall, trend is considered stable.

# TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 13

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	249	*192	59	91	71	5.53
G	Agropyron intermedium	3	3	-	2	1	.03
G	Bromus tectorum (a)	-	113	-	-	40	1.32
G	Elymus junceus	10	*3	1	7	1	.03
G	Koeleria cristata	26	*63	-	13	26	2.53
G	Poa fendleriana	47	58	6	21	22	2.14
G	Poa secunda	-	4	-	-	2	.06
G	Sitanion hystrix	32	*17	8	16	9	.33
G	Stipa columbiana	-	-	1	-	-	-
G	Vulpia octoflora (a)	-	11	-	-	5	.05
Total for Annual Grasses		0	124	0	0	45	1.37
Total for Perennial Grasses		367	340	75	150	132	10.67
Total for Grasses		367	464	75	150	177	12.05
F	Agoseris glauca	-	*18	-	-	10	.12
F	Antennaria rosea	3	-	-	1	-	-
F	Arabis spp.	2	4	-	1	3	.01
F	Artemesia biennis	1	-	-	1	-	-
F	Aster spp.	2	5	-	1	3	.04
F	Astragalus spp.	-	7	-	-	3	.09
F	Balsamorhiza hookeri	2	-	-	1	-	-
F	Castilleja linareaefolia	-	-	5	-	-	-
F	Calochortus nuttallii	-	*20	1	-	10	.05
F	Cirsium calcareum	4	*17	-	2	10	.49
F	Collinsia parviflora (a)	43	*17	-	20	11	.05
F	Crepis occidentalis	1	-	1	1	-	-
F	Draba spp. (a)	-	30	-	-	15	.15
F	Epilobium paniculatum (a)	-	29	-	-	12	.06
F	Erigeron pumilus	2	*34	-	1	15	.24
F	Eriogonum umbellatum	15	*40	-	8	17	.65
F	Lithospermum spp.	-	4	-	-	1	.03
F	Lomatium spp.	-	*7	-	-	4	.02

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
F	Lupinus argenteus	-	*12	-	-	5	.19
F	Melilotus officinalis	28	*60	4	11	24	1.88
F	Microsteris gracilis (a)	-	13	-	-	8	.04
F	Papaver spp.	-	-	2	-	-	-
F	Phlox longifolia	-	6	-	-	2	.01
F	Polygonum douglasii (a)	-	14	-	-	7	.03
F	Ranunculus spp. (a)	-	54	-	-	20	.22
F	Spheralcea grossulariaefolia	-	-	3	-	-	-
F	Tragopogon dubius	1	-	-	1	-	-
F	Unknown forb-annual (a)	-	80	-	-	38	.56
F	Viguiera multiflora	35	*5	-	18	3	.18
F	Zigadenus paniculatus	-	3	-	-	2	.01
Total for Annual Forbs		43	183	0	20	91	0.90
Total for Perennial Forbs		96	296	16	47	132	4.27
Total for Forbs		139	479	16	67	223	5.17

\* Indicates significant difference at % = 0.10 (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 13

Type	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	5	1.08
B	Artemisia tridentata vaseyana	89	14.92
B	Chrysothamnus parryi howardi	1	-
B	Gutierrezia sarothrae	41	1.74
B	Juniperus osteosperma	14	3.59
B	Opuntia spp.	2	-
B	Purshia tridentata	1	.15
B	Quercus gambelii	3	1.41
B	Quercus turbinella	1	.38
Total for Browse		157	23.30

#### CANOPY COVER --

Herd unit 30 , Study no: 13

Species	Percent Cover '08
Juniperus osteosperma	5
Pinus monophylla	.60

BASIC COVER --

Herd unit 30 , Study no: 13

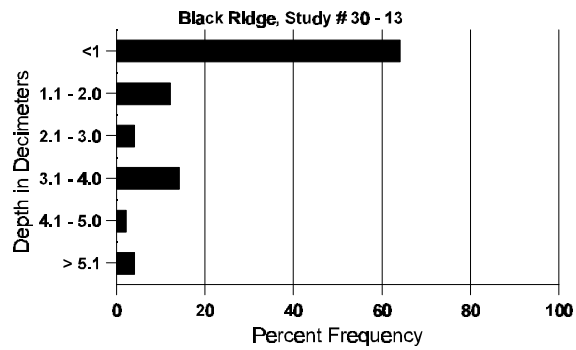
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	334	12.00	6.75	36.18
Rock	328	17.25	34.50	40.43
Pavement	238	5.25	6.00	11.23
Litter	383	57.00	44.00	39.61
Cryptogams	37	1.50	.75	.32
Bare Ground	202	7.00	8.75	6.98

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 13, Study Name: Black Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
24.2	44.8 (17.7)	6.0	32.0	33.4	34.6	2.1	4.2	76.8	.5

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 13

Type	Quadrat Frequency '98
Rabbit	12
Elk	1
Deer	17

## BROWSE CHARACTERISTICS --

Herd unit 30, Study no: 13

Field unit 56, Study no. 15																		
A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches)		Total				
		1	2	3	4	5	6	7	8	9		1	2		3	4	Ht.	Cr.
Amelanchier utahensis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	1	-	-	18	-	-	-	-	-	19	-	-	-	380			19
M	82	4	1	-	-	-	-	-	-	-	4	1	-	-	333	11	18	5
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	37	1	-	-	-	-	-	-	-	38	-	-	-	760	41	45	38
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		20%			00%			00%			-60%							
'92		00%			00%			00%			+88%							
'98		02%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	333	Dec:	-			
												'92	133		-			
												'98	1140		-			
Artemisia tridentata vaseyana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	69	-	-	7	-	-	6	-	-	82	-	-	-	5466			82
	98	77	-	-	41	-	-	-	-	-	118	-	-	-	2360			118
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	88	3	-	1	-	-	2	-	-	94	-	-	-	6266			94
	98	93	1	-	3	-	-	-	-	-	96	-	1	-	1940			97
M	82	7	-	-	-	-	-	-	-	-	7	-	-	-	466	14	25	7
	92	44	7	-	6	-	-	-	-	-	57	-	-	-	3800	14	18	57
	98	137	31	-	3	3	-	-	-	-	167	-	7	-	3480	19	31	174
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	1	-	-	-	-	1	-	1	-	133			2
	98	28	2	-	3	-	-	-	-	-	21	-	-	12	660			33
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+94%							
'92		07%			00%			.65%			-40%							
'98		12%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	599	Dec:	0%			
												'92	10199		1%			
												'98	6080		11%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus parryi howardi																		
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	-	-	-	2	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			100%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	40		100%			
Gutierrezia sarothrae																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	92	41	-	-	-	-	-	-	-	-	41	-	-	2733		41		
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	92	6	-	-	-	-	-	-	-	-	6	-	-	400		6		
	98	23	-	-	2	-	-	-	-	-	25	-	-	500		25		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0		
	92	19	-	-	6	-	-	-	-	-	25	-	-	1666	9	25		
	98	133	-	-	-	-	-	-	-	-	133	-	-	2660	6	133		
D	82	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	4	-	-	-	-	-	-	-	-	3	-	-	80		4		
X	82	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	98	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			+36%							
		'98			00%			00%			.61%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	2066		0%			
												'98	3240		2%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	82	10	-	-	-	-	-	-	-	-	8	2	-	-	666	47	27	10
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	200	30	62	3
	98	8	-	-	2	-	-	-	-	-	10	-	-	-	200	-	-	10
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-58%							
'92		00%			00%			00%			- 4%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	799	Dec:	-			
												'92	333		-			
												'98	320		-			
Opuntia spp.																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	17	1
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	3	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	132		-			
												'98	40		-			
Purshia tridentata																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	1	-	-	-	-	1	-	-	-	20	12	100	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140	60 41	7	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	-			
												'92	0		-			
												'98	140		-			
Quercus turbinella																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200	61 28	10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	200		-			

## DISCUSSION

### Trend Study No. 30-18 (50A-18)

\*\*\* This site was not read in 1998. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Grants Ranch Trail trend study is on deer summer range immediately adjacent to a permanent pellet group transect on the Grants Ranch-Comanche Creek trail. The study site is a gentle (5% to 10%) southeast slope at an elevation of 7,800 feet. The vegetative appearance is mixed mountain brush with a few scattered Colorado pinyon, Utah juniper, and curlleaf mountain mahogany trees. There is evidence of considerable summer deer use. Deer trails, beds, and numerous pellet groups were encountered during the 1992 reading. This area occurs on the 67,000 acre Pine Valley allotment which is grazed by 1,057 cattle from July 15 to October 15. The number of cattle were reduced by 15% in 1992. No livestock were encountered on the site during the 1992 reading. Since 1982, this area has experienced five of six years of drought. Precipitation in 1992 was considered good.

Soils are fairly deep but quite rocky and coarsely textured. Ground cover is principally litter, rock (i.e., boulders), cryptogams, and vegetative cover consisting primarily of the aerial portions of shrubs. Sheet erosion and gullying are noticeable in localized places, especially on the trail, but overall, soil condition appears stable.

Browse composition is dominated by low to medium height Gambel oak, underlain by smaller oaks, mountain snowberry, mountain big sagebrush, and an occasional antelope bitterbrush. These species furnish most of the available browse forage. Taller shrubs and trees are scattered throughout. Gambel oak has increased 72% from 5,266 plants/acre in 1982, to 18,865 by 1992. Reproductive potential is high with 48% of the population consisting of young plants. Utilization has increased from zero to 42% of oak displaying heavy hedging. Utah serviceberry has also increased in density. During the 1982 reading, only 200 plants/acre were estimated. By 1992, there were an estimated 5,799 plants/acre, a 97% increase. Utilization is light to moderate and vigor is good. Mountain big sagebrush has increased slightly, but the population is becoming increasingly decadent (0 to 24%). Utilization has become heavier. In 1982, no sagebrush was classified as heavily hedged. By 1992, 54% of the sagebrush encountered were classified as heavily hedged (> 60% of the stems browsed). No seedlings and few young plants were counted. Curlleaf mahogany has doubled in density since 1982. Several seedlings and young plants were encountered.

Understory grass and forb density is sparse, but there is an excellent mix of species. Of the perennial grasses, Letterman needlegrass, muttongrass, and needle-and-thread grass are most abundant. Utilization of grasses is uniformly light. Thirteen forb species were encountered. The most common and productive forbs are arrowleaf balsamroot, Phacelia sp., and Lupinus holosericeus. Forbs are perhaps the most utilized class of forage on the area. The more preferred and succulent species show generally light to moderate use. Arrowleaf balsamroot, Lupinus holosericeus, and redroot eriogonum seem especially preferred.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is stable. A fair to good ground cover, in combination with gentle terrain, has limited soil loss. However, one place to watch carefully is the well-traveled trail in the area. It is currently the largest source of erosion on the site. Vegetative trend is stable, but could change. A key factor will be the growth pattern of oakbrush. If it should become excessively dominant the habitat could suffer. Canopy closure from pinyon-juniper is not an immediate threat.

## 1992 TREND ASSESSMENT

Soil trend has improved since 1982. Basal vegetative cover has increased by 63%, while bare ground has declined 91%, from 11% to only 1%. Trail maintenance and water bars are needed on the trail as it is still eroding. Due to the cutting of runoff water, the trail currently resembles a ditch. The key browse species have all increased. Oak has more than tripled in density while showing increasing utilization. Mountain big sagebrush has increased slightly, but shows signs of being crowded out of the site. Utah serviceberry has increased by 97% and has a dynamic reproductive potential. The overall browse trend has improved, but possibly at the expense of the understory. The herbaceous understory is diverse, but not abundant. Quadrat frequencies of grasses and forbs have remained basically unchanged since 1982. Trend for grasses and forbs is stable.

### TREND ASSESSMENT

soil - improved

browse - up for taller species

herbaceous understory - stable

## DISCUSSION

### Trend Study No. 30-24 (50B-4)

\*\*\* This site was not read in 1998. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Paradise trend study is located in a sagebrush-grass type slightly west of Paradise Reservoir. Terrain is gentle (about 5% slope) and exposure is northerly at an elevation of 7,500 feet. The area is grazed by cattle during July 15-October 15. This also constitutes important fawn rearing habitat for deer. Surrounding range types are oakbrush, mountain brush, some scattered pinyon-juniper, and a few small aspen clones in the drainage channels. Year-round water is nearby.

Soil is relatively deep and compacted, but tends to be rocky on the surface. Texture is moderately coarse. The main source of hydrologic activity is a natural drainage and a few active gullies. Percent bare ground has decreased from 40% to 17%, while vegetative cover has increased from 5% to 13%. Litter has also increased from 54% to 65% with rock and pavement staying nearly the same.

Vegetative composition is relatively rich, although the number and density of increaser species is somewhat disturbing. The key browse species, mountain big sagebrush, comprised 40% of browse population in 1982 and now comprises only 23%. Sagebrush shows light utilization and the percent decadency of the population has decreased from 53% to 23%. Some of the seedlings encountered in 1982 have apparently survived and are rejuvenating the stand. Antelope bitterbrush has increased in density to 133 plants/acre from 66 plants/acre, but all mature plants are heavily hedged. Stickyleaf low rabbitbrush, an aggressive invader, is the most abundant browse species comprising 53% of the browse population. This population has increased from 6,399 plants/acre in 1982 to 7,266 plants/acre in 1992. Although the population has increased, so has the percent of decadent plants from 2% to 17%. This population should be used as an indicator of management. Parry's rabbitbrush was encountered in 1992. This is a moderately palatable plant with a density of 1,332 plants/acre. Greene's rabbitbrush has increased from 266 plants/acre to 399 plants/acre. Wood's rose increased from 266 plants/acre to 1,333 plants/acre.

As an important fawning area, grasses and especially forbs are the key species on this site. Quadrat frequencies are relatively high. Letterman needlegrass, mutton grass, and western wheatgrass have all increased. The slight increase in prairie junegrass is also an indicator of an increase in summer precipitation. Desirable grasses include three species of bluegrass (*Poa* sp.) and prairie junegrass, which must maintain themselves if a downward trend is to be avoided. Western wheatgrass showed the greatest increase of all the grasses, but is not as preferred by wildlife in the summer months. Among forbs, arrowleaf balsamroot is common, but like most other forbs, showed little evidence of use. More desirable forbs include: tapertip hawksbeard, redroot eriogonum, Utah deervetch, and Lewis flax. In addition to encountered grasses and forbs, there are also a number of annuals and perennials that were observed but not sampled. Prominent among these are basin wildrye, tarragon, and Wyoming painted cup. Utilization of forbs is uniformly light and overall vigor is high. Many of the species encountered are not very palatable to wildlife and most are increasers.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is stable. There is only minimal soil movement even though the percentage (40%) of bare ground is high. Vegetative trend is stable to declining. Unsatisfactory signs include apparently expanding populations of stickyleaf low rabbitbrush, needlegrass species, and rock goldenrod. Mountain big sagebrush, the key species, is barely maintaining itself. Utilization by livestock or big game does not appear to be an overriding factor at this time.

## 1992 TREND ASSESSMENT

Rock and pavement cover is stable and abundant ground cover in the form of vegetation and litter is keeping the soil intact. Bare ground cover has dropped from 40% to 17% and it was noted that erosion seems to be more of a problem on the south facing hill opposite the study site. The populations of all browse species have increased. The increase in the rabbitbrush might be cause for concern, when the type of forbs that have also appeared are also considered.

### TREND ASSESSMENT

soil - up

browse - slightly up

herbaceous understory - slightly up

Trend Study 30-26-98

Study site name: Grassy Flat Ridge .

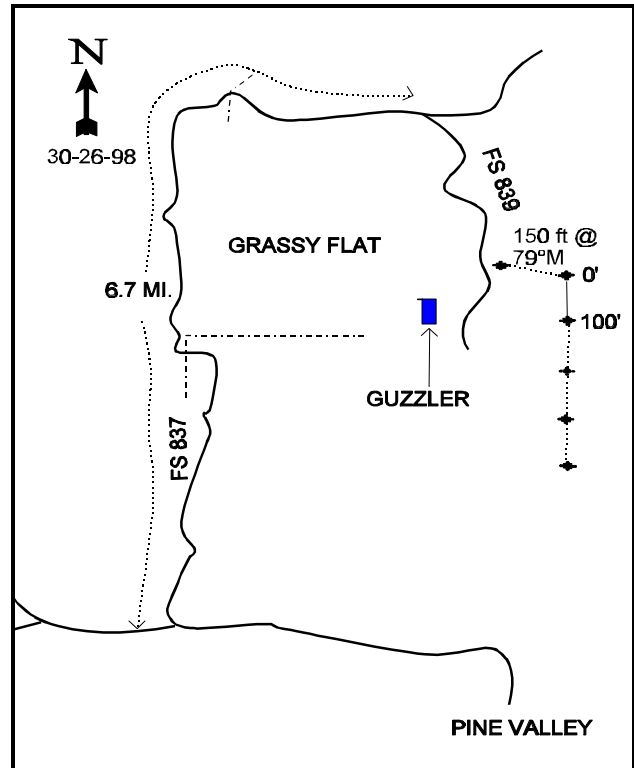
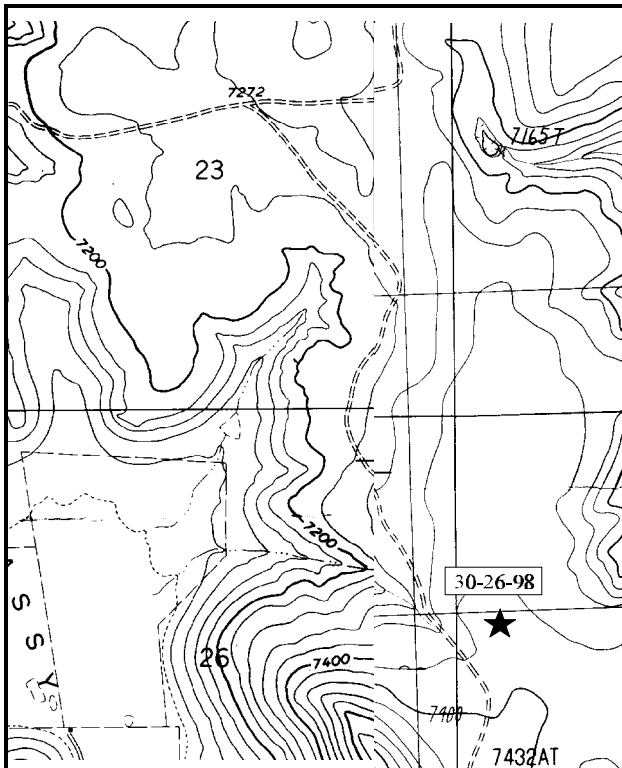
Range type: Mountain Brush .

Compass azimuth: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (16 & 89ft), line 2 (39ft), line 3 (48ft), line 4 (63ft).

LOCATION DESCRIPTION

From the town of Pine Valley, travel west towards Central 1.5 miles to the dirt road to Pinto. Continue west 0.75 miles to the Gray's Ranch-Grassy Flat Road on the north side of the road. Go north on this road approximately 2.8 miles and turn left. From here continue on road for 3.9 miles to Forest Service road #839. Bear right (south) here and travel 1.5 miles to the guzzler on the right (west) and a witness post on the left (east). From the witness post the 0-foot stake is 150 feet away at an azimuth of 79°M. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.



Map Name: Grass Valley & Central East

Diagrammatic Sketch

Township 38S , Range 15W , Section 25 .

UTM 4147708.627 N, 279275.249 E

## DISCUSSION

### Trend Study No. 30-26 (50B-2)

The Grassy Flat Ridge trend study is on a relatively low elevation summer range near the summit of the ridge, lying between the South Fork of Pinto Creek and Grassy Flat. Terrain varies, but the site has a 5% slope to the west and an elevation of 7,200 feet. The vegetative type is sagebrush-grass with low abundance of seeded grasses. A "guzzler" is located about 200 yards to the southwest of the study site. Wildlife and livestock use has been reported high in the past, most likely due to the guzzler. Pellet group data taken from the site on June 30, 1998 estimate moderate use by deer with 32 deer days use/acre. No livestock have been on the site yet this season, however they will be here later in the summer. Livestock grazing occurs from July 1-August 15 and is on a deferred rotation system.

Soils are igneous, coarse in texture, and very rocky over most of the area. Effective rooting depth (see methods) is estimated at almost 12 inches. Texture is a clay loam with a moderately acid pH (5.8). Phosphorus may be limiting at 7.2 ppm, when 10 ppm is considered a minimal value for normal plant development. Rock and pavement are abundant on the surface and have increased from 29% to 41% between 1982 and 1998. Erosion was noted as slight and the only active gullies occurred on the road.

The key browse species are mountain big sagebrush and antelope bitterbrush. Sagebrush currently ('98) accounts for 54% of the browse cover, while bitterbrush provides an additional 24%. Density of big sagebrush was estimated at 2,333 plants/acre in 1982. No seedlings or young plants were encountered. The population increased 64% by 1992. Seedlings and young plants were very abundant with a biotic potential of 37%, and 56% of the population consisting of young plants. Density increased an additional 12% by 1998 to 7,260 plants/acre. Biotic potential is still high at 15% and young plants account for 43% of the population. Utilization has been mostly light to moderate over the years with a few individuals displaying heavy hedging. Vigor is good and percent decadence has remained low, currently at only 4%.

Antelope bitterbrush has increased slightly since 1982, but density has remained fairly stable since 1992. Utilization was mostly moderate in 1982, but extremely heavy in 1992 and 1998 with 82% and 83% of the bitterbrush showing heavy use. Most plants are partly unavailable due to the high level of use. Even with this heavy use, vigor is still normal on most plants and percent decadence is currently ('98) only 17%. Secondary browse species include: Utah serviceberry, dwarf rabbitbrush, and occasional individuals of Gambel oak and curlleaf mountain mahogany. Broom snakeweed, an invader/increaser, also occurs on the site in moderate numbers. Density increased from 1,332 plants/acre in 1982 to 5,199 by 1992. During the 1998 reading, density declined 48% to 2,720 plants/acre. Age class analysis indicates a stable to slightly increasing population. No seedlings were encountered, although 32% of the population consists of young plants.

Herbaceous quadrat frequency and sum of nested frequency is nearly equal between grasses and forbs with both increasing between 1982 and 1992. Four perennial grasses dominate the grass composition. These are: pubescent wheatgrass, mutton bluegrass, bottlebrush squirreltail, and Letterman needlegrass. Forbs are diverse, but the composition consists primarily of increasers, poisonous plants, and other low-growing species of minimal forage value. The most abundant forbs are wild onion, littleleaf pussytoes, and foothill deathcamas. Sulfur eriogonum and Eaton fleabane are also fairly common.

### 1982 APPARENT TREND ASSESSMENT

A best estimate of soil trend is slightly downward. Erosion and soil loss are not great, but only because of the gentle terrain. Ground cover is generally poor. Vegetative trend appears to also be declining. Both key species are barely holding their own in the face of a rapidly expanding broom snakeweed population. Grass density is good and may be a competitive influence on shrub reproduction. Forb composition is depleted and shows few signs of improvement.

## 1992 TREND ASSESSMENT

Erosion on the site is slight with an increase in rock and pavement cover and a decrease in bare ground. Ground cover is still poor, but has changed mostly from bare ground to mostly pavement and rock. Basal vegetative cover has increased from 7% to 10%, which is also indicated by the increase in quadrat frequency of forbs and grasses. The grass species are mostly palatable and the composition is good, while the forb species are mostly unpalatable and composition poor. The key browse species, mountain big sagebrush and antelope bitterbrush, have both increased and should be able to tolerate the increase of broom snakeweed. The broom snakeweed population is expanding and should be monitored closely.

### TREND ASSESSMENT

soil - stable

browse - slightly up

herbaceous understory - slightly up, but the forbs are mostly increasers and the poor composition warrants close monitoring

## 1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1992. Trend for the key browse species is mixed. Mountain big sagebrush displays a slightly upward trend due to a 12% increase in population density, good reproduction, normal vigor, and low percent decadence. Bitterbrush shows a stable to slightly downward trend due to continued extremely heavy use. This use is not only from deer. Cattle using the site will switch from grasses to bitterbrush late in the summer, especially during dry years when the perennial grasses dry out. The bitterbrush population has remained at similar density compared to 1992, but reproduction is limited with just enough young plants to replace decadent & dying plants. Trend for the herbaceous understory is slightly down. Sum of nested frequency of both grasses and forbs has declined slightly. Forb composition is still poor.

### TREND ASSESSMENT

soil - stable

browse - up slightly for sagebrush and stable for bitterbrush

herbaceous understory - down slightly

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 26

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	17	*5	12	9	3	.06
G	Agropyron smithii	110	*29	31	42	12	.21
G	Agropyron trichoporum	39	46	10	12	15	3.02
G	Bromus tectorum (a)	-	5	-	-	2	.15
G	Koeleria cristata	32	27	27	13	12	.74
G	Poa bulbosa	-	11	-	-	3	.33
G	Poa fendleriana	144	162	49	65	67	5.16
G	Poa secunda	44	*3	-	19	1	.00
G	Sitanion hystrix	153	138	47	67	62	2.67
G	Stipa lettermani	65	61	17	30	27	1.72

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
	Total for Annual Grasses	0	5	0	0	2	0.15
	Total for Perennial Grasses	604	482	193	257	202	13.94
	Total for Grasses	604	487	193	257	204	14.09
F	Achillea millefolium	3	-	-	1	-	-
F	Agoseris glauca	24	*11	-	15	5	.05
F	Allium acuminatum	158	*267	48	62	90	2.50
F	Antennaria parvifolia	111	*38	19	51	16	.71
F	Arabis spp.	9	3	8	5	2	.01
F	Astragalus agrestis	10	13	-	7	4	.12
F	Astragalus argophyllus	1	*6	3	1	3	.04
F	Astragalus spp.	8	*-	6	4	-	-
F	Balsamorhiza sagittata	-	-	1	-	-	-
F	Calochortus nuttallii	11	12	15	6	6	.05
F	Cirsium spp.	5	7	-	2	3	.06
F	Collinsia parviflora (a)	-	61	-	-	22	.18
F	Crepis acuminata	-	3	-	-	2	.01
F	Epilobium paniculatum (a)	-	27	-	-	11	.10
F	Erigeron eatonii	56	*7	15	27	3	.21
F	Erigeron pumilus	4	*13	1	2	7	.06
F	Eriogonum umbellatum	76	*28	31	36	12	.41
F	Haplopappus spp.	1	-	14	1	-	-
F	Hymenoxys richardsonii	4	-	2	2	-	-
F	Lomatium spp.	1	6	2	1	2	.03
F	Lupinus argenteus	2	-	-	1	-	-
F	Machaeranthera canescens	3	-	-	1	-	-
F	Microsteris gracilis (a)	-	1	-	-	1	.00
F	Penstemon caespitosus	1	-	-	1	-	-
F	Phlox longifolia	7	6	2	4	2	.03
F	Polygonum douglasii (a)	-	77	-	-	32	.21
F	Sphaeralcea coccinea	3	1	1	2	1	.00
F	Tragopogon dubius	-	3	-	-	1	.00
F	Viguiera multiflora	1	-	-	1	-	-
F	Zigadenus paniculatus	93	*69	21	44	37	.67
	Total for Annual Forbs	0	166	0	0	66	0.50
	Total for Perennial Forbs	592	493	189	277	196	5.01
	Total for Forbs	592	659	189	277	262	5.51

\* Indicates significant difference at % = 0.10 (annuals excluded)

# BROWSE TRENDS --

Herd unit 30 , Study no: 26

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	12	1.54
B	Artemisia tridentata vaseyana	93	9.15
B	Cercocarpus ledifolius	2	.15
B	Chrysothamnus depressus	29	.42
B	Gutierrezia sarothrae	45	.39
B	Opuntia spp.	17	.31
B	Pinus edulis	2	.38
B	Purshia tridentata	29	4.09
B	Quercus gambelii	5	.56
B	Tetradymia canescens	4	.03
Total for Browse		238	17.04

# BASIC COVER --

Herd unit 30 , Study no: 26

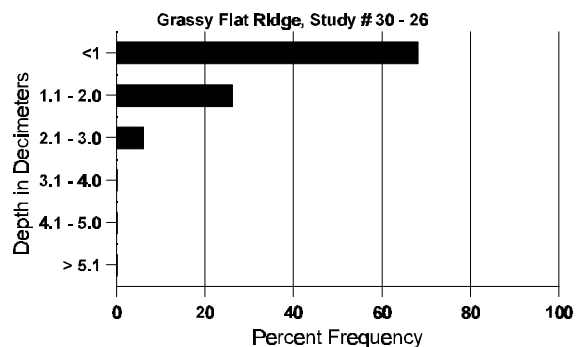
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	342	7.00	9.75	37.62
Rock	311	27.75	28.75	35.28
Pavement	216	.75	17.75	5.62
Litter	369	31.00	25.00	29.13
Cryptogams	3	.75	0	.15
Bare Ground	264	32.75	18.75	19.05

# SOIL ANALYSIS DATA --

Herd Unit 30, Study # 26, Study Name: Grassy Flat Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.6	58.6 (13.8)	5.8	36.0	31.4	32.6	1.5	7.2	83.2	.5

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 26

Type	Quadrat Frequency '98
Sheep	2
Rabbit	3
Deer	31
Cattle	4

BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 26

Forest Unit 55 ; Study No. 20																			
A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Amelanchier utahensis																			
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	1	-	-	-	-	1	-	-	20			1	
M	82	-	3	-	-	-	-	-	-	-	-	3	-	-	200	20	24	3	
	92	-	1	4	-	-	-	-	-	-	5	-	-	-	333	29	26	5	
	98	4	5	2	-	1	3	-	-	3	17	1	-	-	360	38	40	18	
% Plants Showing		<u>Moderate Use</u>					<u>Heavy Use</u>					<u>Poor Vigor</u>				<u>%Change</u>			
'82		100%					00%					00%				+40%			
'92		20%					80%					00%				+12%			
'98		32%					47%					00%							
Total Plants/Acre (excluding Dead & Seedlings)														'82	200	Dec:	-		
														'92	333		-		
														'98	380		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	35	-	1	9	-	-	3	8	-	56	-	-	-	3733		56	
	98	70	-	-	-	-	-	-	-	-	70	-	-	-	1400		70	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	45	5	3	1	-	-	-	-	-	54	-	-	-	3600		54	
	98	144	11	-	1	-	-	-	-	-	156	-	-	-	3120		156	
M	82	33	-	-	-	-	-	-	-	-	27	6	-	-	2200	11 18	33	
	92	11	13	3	1	-	-	-	-	-	26	2	-	-	1866	18 21	28	
	98	128	58	-	5	-	2	-	-	-	188	2	3	-	3860	24 26	193	
D	82	-	2	-	-	-	-	-	-	-	-	-	2	-	133		2	
	92	8	3	2	-	-	1	-	-	-	10	-	4	-	933		14	
	98	4	9	-	-	-	-	-	-	1	4	-	3	7	280		14	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		06%			00%			06%			+64%							
'92		22%			09%			04%			+12%							
'98		21%			.82%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	2333	Dec:	6%			
												'92	6399		15%			
												'98	7260		4%			
Cercocarpus ledifolius																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	-	-	-	1	-	1	-	-	-	2	-	-	-	40	44 50	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus depressus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	3	-	-	2	-	-	6	-	-	-	400		6	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	9	1	2	13	-	-	-	-	-	25	-	-	-	1666		25	
	98	16	-	-	-	-	-	1	-	-	17	-	-	-	340		17	
M	82	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	7 9	15	
	92	3	7	5	11	-	-	-	-	-	26	-	-	-	1733	4 8	26	
	98	50	13	-	1	-	-	-	-	-	64	-	-	-	1280	6 11	64	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	98	1	1	-	-	-	1	-	-	-	3	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+70%							
'92		14%			13%			00%			-55%							
'98		17%			01%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1133	Dec:	0%			
												'92	3732		9%			
												'98	1680		4%			
Gutierrezia sarothrae																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	3	-	-	1	-	-	7	-	-	-	466		7	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	19	-	-	-	-	-	-	-	-	19	-	-	-	1266		19	
	92	16	-	-	5	-	-	-	-	-	21	-	-	-	1400		21	
	98	44	-	-	-	-	-	-	-	-	44	-	-	-	880		44	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	9 10	1	
	92	55	-	-	1	-	-	-	-	-	56	-	-	-	3733	12 7	56	
	98	87	3	2	-	-	-	-	-	-	92	-	-	-	1840	7 6	92	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+74%							
'92		00%			00%			00%			-48%							
'98		02%			01%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1332	Dec:	0%			
												'92	5199		1%			
												'98	2720		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	3	-	-	-	-	-	-	-	-	3	-	-	-	200	6	15	3
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	333	7	9	5
	98	13	-	-	3	-	-	-	-	-	16	-	-	-	320	7	20	16
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	98	2	-	-	-	-	-	-	-	-	-	-	-	2	40		2	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+50%							
'92		00%			00%			17%			- 5%							
'98		00%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	200	Dec:	0%			
												'92	399		17%			
												'98	380		11%			
Pinus edulis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	2	-	-	-	-	-	2	-	-	-	133		2	
	98	-	1	-	-	1	1	-	-	-	3	-	-	-	60		3	
M	82	1	7	-	-	-	-	-	-	-	8	-	-	-	533	16	22	
	92	-	-	7	-	-	-	-	-	-	7	-	-	-	466	11	25	
	98	1	-	7	1	1	4	-	-	12	26	-	-	-	520	12	34	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	2	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	2	-	-	3	1	-	-	3	-	-	3	120		6	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		88%			00%			00%			+27%							
'92		00%			82%			00%			- 4%							
'98		09%			83%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	533	Dec:	0%			
												'92	732		18%			
												'98	700		17%			
Quercus gambelii																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	9	5	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40	38	48	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	3	-	-	-	-	3	-	-	4	140		7	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		35%			00%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	460		30%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	6	9	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:		-	
												'92		0			-	
												'98		100			-	

Trend Study 30-29-98

Study site name: Southwest of New Castle .

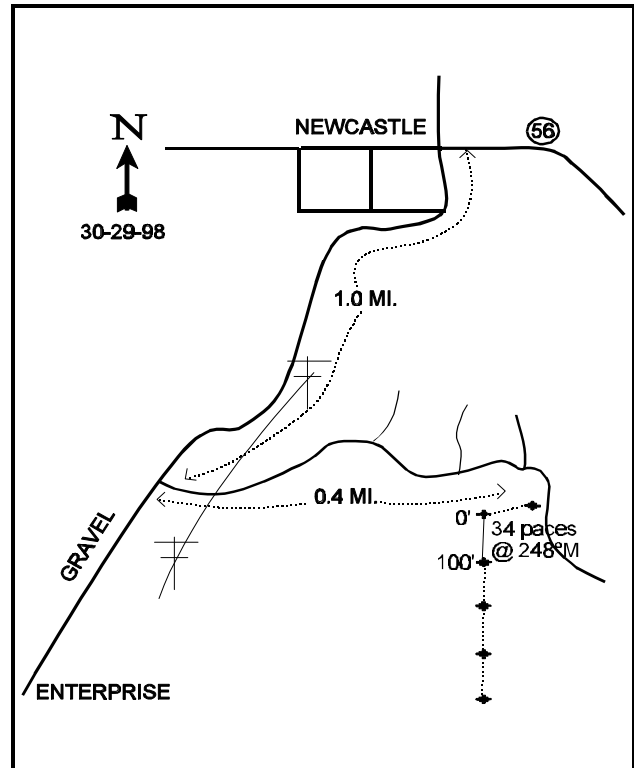
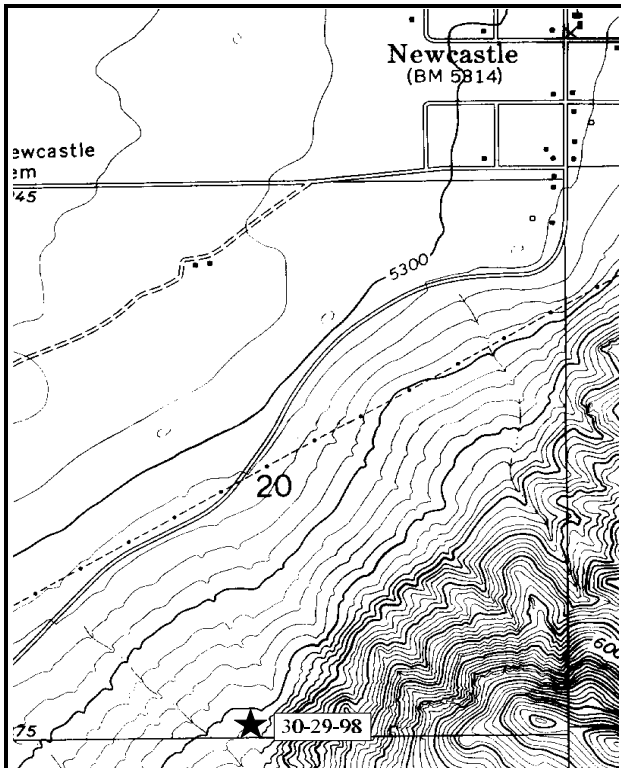
Range type: Sagebrush-Grass .

Compass azimuth: frequency baseline 176 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (12 & 92ft), line 2 (39ft), line 3 (50ft), line 4 (79ft).

LOCATION DESCRIPTION

From the intersection of Pinto-Canyon Road and Main Street in New Castle, proceed south on Main Street 1.0 mile towards Enterprise. Turn left (i.e., east) and travel 0.40 miles until you come to a fork. Take a right and continue 0.15 miles to a witness post on the right side of the road. From the witness post walk 34 paces at 248°M to the 0-foot stake. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.



Map Name: New Castle

Diagrammatic Sketch

Township 36S , Range 15W , Section 20

UTM 4169411.217 N, 274301.118 E

## DISCUSSION

### Trend Study No. 30-29 (50B-6)

The Southwest of Newcastle range study surveys severe winter range southwest of Newcastle. The site is an alluvial fan occupied by Wyoming big sagebrush underlain by a sparse herbaceous understory. The terrain slopes moderately (15% to 20%) to the west-northwest at an elevation of approximately 5,600 feet. Pellet group data taken on the site in 1998 estimate 68 deer days use/acre. Most of the deer pellet groups appeared to be from last winter. No sign of cattle grazing was noted.

Soil is alluvially deposited from basalt parent material. Effective rooting depth (see methods) is estimated at just over 15 inches. Soil texture is a sandy clay loam with a slightly acid pH (6.4). The surface is covered by gravel 1/4" to 2" in size with some larger rocks mixed in. Rock is also common throughout the profile. Bare ground cover mostly occurs in small interspaces associated with the rocky surface. Ground cover is composed mostly of shrub crowns and ephemeral litter from dead cheatgrass. Soil movement was wide spread in 1982 with several small rills and gullies present. Currently, erosion appears minimal.

Wyoming big sagebrush is the prominent key species. Its population had increased from 3,633 to 5,799 plants/acre between 1982 and 1992. However, density has declined to 4,860 plants/acre by 1998 due to a reduction in the number of young and decadent plants. The number of dead plants in the population more than accounts for the decrease in the estimated population. Density of mature sagebrush increased by 34%. Utilization was light in 1982, but heavy in 1992 with many plants displaying a clubbed growth form and stunted growth. Overall vigor was good in 1992, although some plants showed disease and insect infestation. During the 1998 reading, utilization was more moderate, yet heavy use was still noted on 20% of the sagebrush. Reproduction is currently ('98) poor with a biotic potential of only 1%, with young plants making up only 2% of the population. Percent decadence has declined slightly since 1992, however the proportion of decadent shrubs classified as dying has increased from 18% to 38% (400 to 600 plants/acre). Dead plants are also common at an estimated 1,380 plants/acre in 1998, a ratio of dead to live plants of about 1:4.

The only other shrub of significance is stickyleaf rabbitbrush which currently ('98) numbers 920 plants/acre. Broom snakeweed and pricklypear are both present in small quantities, but pose little threat to the community at this time. The much larger sample used in 1998, picked up a few green ephedra which provide some additional forage. Pinyon and juniper trees are increasing down slope from the tree dominated hills to the east. Point quarter data from 1998 estimate 26 singleleaf pinyon and 32 Utah juniper trees/acre. Average basal diameter was estimated at 2.3 inches for pinyon and 6.8 inches for juniper. Photo point comparisons suggest an increase in density and size of the trees, but no point quarter data is available from 1982 of 1992. The shrub density plots from earlier years were too small to properly sample pinyon and juniper densities.

Perennial grasses and forbs occur infrequently and are of little significance as a forage source. The two most abundant perennial grasses include, galleta grass and Sandberg bluegrass. Indian ricegrass and bottlebrush squirreltail are also fairly common. Cheatgrass brome was present in 1982 but not widespread. By 1998, it represents the most abundant grass on the site by providing 65% of the grass cover and 63% of the total herbaceous cover. Sixweeks fescue is also fairly abundant. Annual grasses and forbs were not included in previous samples so no comparisons can be made. Forbs are nearly nonexistent for all species, annual or perennial, combining to produce less than 1% cover in 1998.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is stable to declining. Enough soil remains on the site to allow greater forage production than is currently available. The rate of erosion, while not rapid, is enough to result in a negative trend. Vegetative trend is stable. Browse production is adequate, but the depleted understory lessens the value of this community. This site has a better potential for rehabilitation than similar sites in Bullion Canyon and near Newcastle Reservoir.

## 1992 TREND ASSESSMENT

The percent of bare ground has decreased from 48% in 1982 to 8% in 1992. Rock and pavement have stayed nearly the same, while both vegetation and litter cover have greatly increased. Erosion appears to have slowed and is not as great as reported before. All grass species have increased, but are normally utilized more during the fall and spring than on deer winter range. Wyoming big sagebrush has increased, but shows signs of heavy use which may increase rate of decadency. Stickyleaf rabbitbrush is stable and doesn't appear to be increasing.

### TREND ASSESSMENT

soil - up

browse - slightly up

herbaceous understory - slightly up

## 1998 TREND ASSESSMENT

Soil trend is down slightly. Percent bare ground has increased from 8% to 18%, while litter cover has declined and pavement cover has increased from 4% to 23%. The increase in pavement cover suggests surface soil movement has occurred since 1992. Trend for browse is down slightly. Density of Wyoming big sagebrush has declined 16% since 1992 due to a reduction in young and decadent plants. The number of mature plants increased from 2,100 to 3,160 plants/acre. Utilization is more moderate, but the proportion of sagebrush displaying poor vigor has increased from 9% to 15%. Percent decadence has declined slightly from 37% to 33%, however a greater number of decadent plants are classified as dying. Reproduction is currently poor. There are few seedlings, and young plants represent only 2% of the population which is not enough to replace the decadent/dying shrubs. Trend for the herbaceous understory is slightly down for grasses, although slightly up for forbs. Composition is poor however. Cheatgrass dominates the herbaceous understory by providing 63% of the total herbaceous cover and perennial forbs are lacking. Overall, trend is considered slightly down.

### TREND ASSESSMENT

soil - down slightly

browse - down slightly

herbaceous understory - down slightly

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 29

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Bromus tectorum (a)	-	368	-	-	100	18.18
G	Hilaria jamesii	124	151	33	51	63	4.36
G	Oryzopsis hymenoides	26	30	9	11	13	1.47
G	Poa secunda	77	85	2	31	32	2.15
G	Sitanion hystrix	151	*36	47	65	20	1.02
G	Vulpia octoflora (a)	-	150	-	-	58	.98
Total for Annual Grasses		0	518	0	0	158	19.17
Total for Perennial Grasses		378	302	91	158	128	9.01
Total for Grasses		378	820	91	158	286	28.18

T y p e	Species	Nested Frequency		Quadrat Frequency			Average Cover % '98
		'02	'08	'82	'92	'98	
F	Arabis spp.	-	2	-	-	1	.03
F	Astragalus spp.	2	-	-	1	-	-
F	Castilleja linariaefolia	-	1	-	-	1	.03
F	Calochortus nuttallii	3	*16	-	2	8	.04
F	Collomia linearis (a)	-	3	-	-	1	.00
F	Cryptantha spp.	-	32	-	-	13	.19
F	Cymopterus spp.	-	9	-	-	4	.02
F	Descurainia pinnata (a)	-	24	-	-	16	.08
F	Draba spp. (a)	-	14	-	-	6	.05
F	Eriogonum cernuum (a)	-	2	-	-	1	.00
F	Eriogonum spp.	4	1	1	3	1	.03
F	Erigeron pumilus	3	7	6	1	4	.02
F	Gilia spp. (a)	-	49	-	-	24	.19
F	Lupinus argenteus	-	4	-	-	2	.01
F	Navarretia intertexta (a)	-	37	-	-	15	.07
F	Orthocarpus spp.	-	-	1	-	-	-
F	Phlox longifolia	14	22	-	8	11	.08
Total for Annual Forbs		0	129	0	0	63	0.42
Total for Perennial Forbs		26	94	8	15	45	0.44
Total for Forbs		26	223	8	15	108	0.87

\* Indicates significant difference at % = 0.10 (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 29

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia tridentata wyomingensis	89	11.61
B	Chrysothamnus viscidiflorus	32	1.56
B	Ephedra nevadensis	3	.00
B	Gutierrezia sarothrae	1	.15
B	Juniperus osteosperma	2	-
B	Opuntia spp.	8	.91
B	Pinus monophylla	1	1.41
B	Sclerocactus	1	-
Total for Browse		137	15.65

BASIC COVER --

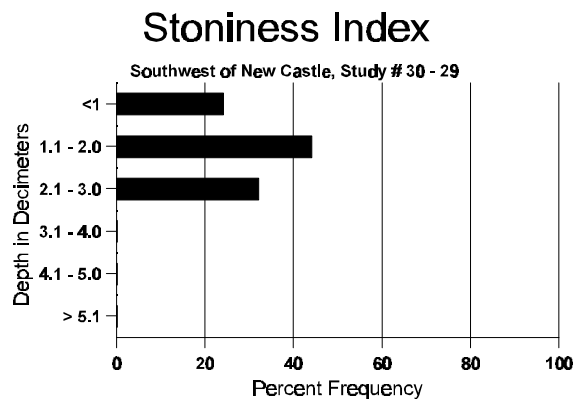
Herd unit 30 , Study no: 29

Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	377	4.00	24.25	43.79
Rock	228	11.50	10.50	7.65
Pavement	334	0	3.75	22.60
Litter	379	36.50	54.00	30.99
Cryptogams	35	.25	0	.39
Bare Ground	284	47.75	7.50	18.28

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 29, Study Name: Southwest of New Castle

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.2	49.0 (16.8)	6.4	54.0	21.4	24.6	1.6	9.37	105.6	.6



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 29

Type	Quadrat Frequency '98
Rabbit	31
Deer	54

## BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 29

Field unit 36, Study no. 29																		
A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata wyomingensis																		
S	82	14	1	-	-	-	-	-	-	-	15	-	-	-	500		15	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	82	15	1	-	-	-	-	-	-	-	16	-	-	-	533		16	
	92	12	18	16	-	-	-	-	-	-	45	1	-	-	1533		46	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	82	70	2	-	-	-	-	-	-	-	45	27	-	-	2400	20	33	72
	92	2	17	42	-	1	-	-	-	1	53	8	2	-	2100	17	22	63
	98	27	92	36	3	-	-	-	-	-	151	-	7	-	3160	16	24	158
D	82	21	-	-	-	-	-	-	-	-	2	17	2	-	700		21	
	92	-	23	37	2	-	-	-	-	3	44	8	1	12	2166		65	
	98	19	44	12	4	-	-	1	-	-	50	-	-	30	1600		80	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1380		69	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		03%			00%			02%			+37%							
'92		34%			57%			09%			-16%							
'98		56%			20%			15%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	3633	Dec:	19%			
												'92	5799		37%			
												'98	4860		33%			
Chrysothamnus viscidiflorus																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	8	-	-	3	-	-	-	-	-	11	-	-	-	366	11	11	11
	98	37	-	-	6	-	-	-	-	-	43	-	-	-	860	12	18	43
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+49%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	466		-			
												'98	920		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ephedra nevadensis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	4	-	-	-	-	-	-	-	4	-	-	-	80	10	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			80%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	100		-			
Gutierrezia sarothrae																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	82	7	6	-	-	-	-	-	-	-	13	-	-	-	433	8	13	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			46%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	433	Dec:	-			
												'92	0		-			
												'98	40		-			
Juniperus osteosperma																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33	4	17	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	66	5	14	
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	13	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+50%							
'92		00%			00%			00%			+70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	33	Dec:	-			
												'92	66		-			
												'98	220		-			
Pinus monophylla																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			
Sclerocactus																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

### Trend Study 30-35-98

Study site name: Deep Canyon .

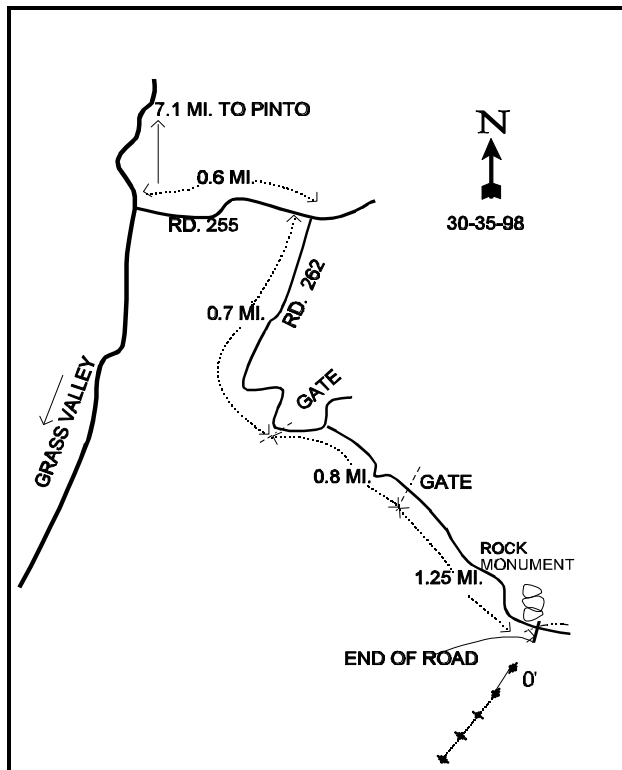
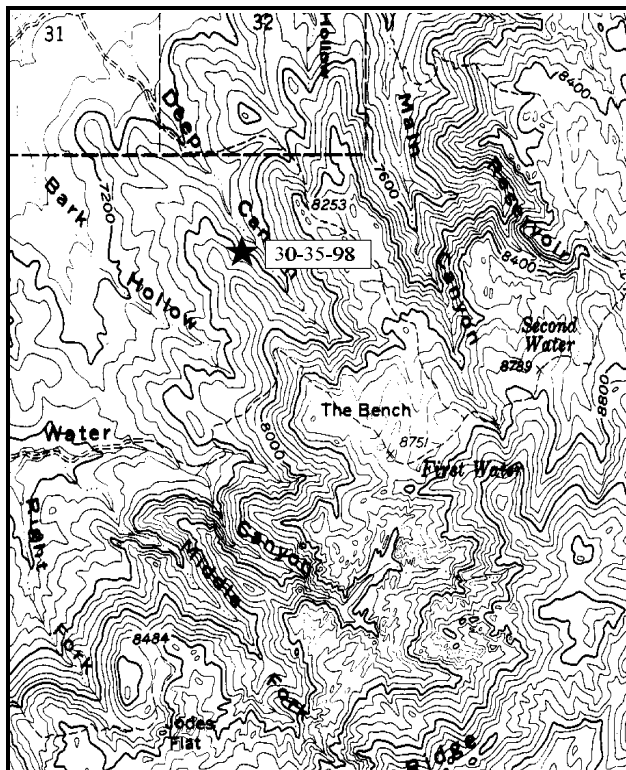
Range type: Mountain Brush .

Compass azimuth: frequency baseline 199 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (19 & 88ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

### LOCATION DESCRIPTION

From Pinto, drive south 7.10 miles toward Grass Valley. Now turn left (i.e., east) on the road toward Whiterocks trail. Proceed on this road for 0.60 miles, at which point there will be an intersection. Go right (southeast) for 0.70 miles to a gate. Proceed through the gate for 0.80 miles to a second gate. Go through the second gate and drive 1.25 miles to the end of the road. There will be a rock monument on the right side of the road at the base of a twin trunked Pinus flexilis. There is also a witness post by the tree. From the witness post walk uphill 33 paces on an azimuth of 178 degrees true to the 0-foot baseline stake. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.



Map Name: New Harmony

Diagrammatic Sketch

Township 39S , Range 15W , Section unsurveyed UTM 4144653.112 N, 283077.880 E

## DISCUSSION

### Trend Study No. 30-35 (50B-12)

The Deep Canyon study is located on fawn rearing habitat in the Deep Creek drainage on the south side of Grass Valley. There is ample vegetation for browsing, escape, and thermal cover. A small stream is located approximately 1/4 mile away at the base of the hill. The study area is mixed mountain brush with a predominantly sagebrush and curlleaf mountain mahogany appearance. Elevation is approximately 7,300 feet on a steep slope which varies from 40% near the 0 foot stake, to 65% near the end of the baseline. Aspect is north-northeast. The study is on the USFS Pine Valley allotment and is grazed from July 15-October 15, although livestock don't appear to be using the steeper slopes. Pellet group data from 1998 (June 30, 1998) estimate 40 deer and only 3 cow days use/acre. Cattle pats appear to be from last season.

Soils are shallow in places and rocky on the surface and within the profile. There is some exposed bedrock. Soil depth is variable, however it is actually moderately deep with an estimated effective rooting depth (see methods) of almost 16 inches. Texture is a sandy loam with a moderately acid pH (5.8). Soil movement is apparent, causing considerable pedestaling on the uphill side of shrubs and trees. Wildlife and livestock also trail across the slope causing abundant terracing. Ground cover is patchy with rock and pavement cover increasing from 11% in 1982, to 36% by 1998. The high rock cover tends to accelerate runoff, and herbaceous vegetation cover is not sufficient to hold the soil.

Browse composition is divided among several species. The taller growth forms include pinyon pine, curlleaf mountain mahogany, and a few mature Gambel oak. Lower growing, more available browse plants include: mountain big sagebrush, slenderbush eriogonum, mountain snowberry, young mahogany, young Gambel oak, and Utah serviceberry. Curlleaf mountain mahogany currently ('98) accounts for 35% of the browse cover on the site. They numbered 866 plants/acre in 1982, increasing to 1,199 by 1992. The larger sample taken in 1998 estimate a lower density of 420 plants/acre. Most plants are at least partly available to browsing, but 20% of the mature plants are tree-like and unavailable due to height. Overhead canopy cover averages 30%. Use of the available shrubs has been moderate to heavy with the heaviest use reported in 1992. Vigor remains normal and percent decadency is low at only 5% in 1998. Recruitment is good with high biotic potentials in 1992 (50%) and 1998 (48%) and nearly 1/3 of the population consisting of young plants.

The primary understory shrubs include: mountain big sagebrush, slenderbush eriogonum, and snowberry. Sagebrush currently provides 31% of the browse cover. The sagebrush population has increased from 1,266 plants/acre in 1982 to 3,500 by 1998. Use has been mostly light, vigor good, and percent decadency declining to only 9% in 1998. Age class composition would indicate an increasing population. Slenderbush eriogonum and snowberry appear to have stable populations displaying light to moderate use, good vigor, and low decadence. Other preferred shrubs that occur in small numbers include: Utah serviceberry, Parry rabbitbrush, and antelope bitterbrush.

The herbaceous understory is moderately abundant, yet provides irregular ground cover. Perennial grasses are diverse with mutton bluegrass and Letterman needlegrass combining to produce 76% of the grass cover in 1998. Blue grama and bottlebrush squirreltail are also fairly abundant.

Forbs are abundant and diverse and produce as much cover as the grasses. However, composition could be better as annuals like littleflower collinsia and false flax (*Microsteris gracilis*) dominate and account for 43% of the forb cover. The most common perennial forbs include: Eaton fleabane, redroot eriogonum, thickleaf peavine, and desert phlox.

## 1982 APPARENT TREND ASSESSMENT

Soil condition is only fair, but is not obviously deteriorating. Trend is stable to improving. Increaser grasses appear to be moving into previously barren areas and may eventually stabilize them. Vegetatively, there is a stable browse component and a vigorous forb understory. Overall vegetative trend is stable.

## 1992 TREND ASSESSMENT

Since 1982, bare ground has decreased and rock and pavement cover combined have increased. Some slight soil erosion was evident, but it was noted that vegetation and rocks have caused a terracing effect that may hold most of the soil in place. Vegetative cover is still low, but has doubled since 1982. Litter cover has increased slightly. Total forb quadrat frequency decreased with only a few select forbs increasing. Browse composition is good and has increased to a total of 12,125 browse plants/acre from the 6,197 plants/acre present in 1982.

### TREND ASSESSMENT

soil - stable

browse - slightly up

herbaceous understory - slightly up

## 1998 TREND ASSESSMENT

Trend for soil is down slightly. Percent bare ground has increased slightly, while litter cover has declined from 46% to 32%. Pavement and rock cover have increased from 11% in 1982, to 29% in 1992, and 36% currently. This increase would suggest soil movement from the site leaving more rock and pavement exposed. Trend for browse is up slightly. Mountain big sagebrush is increasing, whereas other preferred species appear to have stable to slightly increasing populations. Use is lighter overall than what was reported in 1992, vigor is good and percent decadency is low. Trend for the herbaceous understory is down slightly. Sum of nested frequency for perennial grasses is slightly down with a significant decline in the nested frequency of mutton bluegrass. Sum of nested frequency for forbs has declined even more, with several forbs abundant in 1992 declining significantly in frequency.

### TREND ASSESSMENT

soil - down slightly

browse - up slightly

herbaceous understory - down slightly

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 35

T y p e	Species	Nested Frequency		Quadrat Frequency			Average Cover % '08
		'02	'08	'82	'92	'98	
G	Agropyron trachycaulum	5	2	-	2	1	.18
G	Bouteloua gracilis	14	11	4	4	5	.83
G	Bromus tectorum (a)	-	8	-	-	3	.01
G	Carex spp.	3	-	1	1	-	-
G	Koeleria cristata	-	4	-	-	1	.15
G	Poa fendleriana	217	*152	50	81	60	3.85
G	Poa pratensis	-	-	-	-	-	.03

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Poa secunda	-	*34	-	-	12	.45
G	Sitanion hystrix	89	76	27	41	34	.71
G	Stipa columbiana	8	9	-	3	4	.24
G	Stipa comata	5	-	3	2	-	-
G	Stipa lettermani	137	141	36	56	56	4.42
Total for Annual Grasses		0	8	0	0	3	0.01
Total for Perennial Grasses		478	429	121	190	173	10.88
Total for Grasses		478	437	121	190	176	10.90
F	Agoseris glauca	-	*18	-	-	8	.06
F	Antennaria rosea	10	14	8	5	5	.60
F	Arabis spp.	9	12	-	5	5	.02
F	Astragalus argophyllus	13	*-	1	8	-	-
F	Astragalus spp.	7	2	6	3	2	.30
F	Balsamorhiza sagittata	-	3	-	-	1	.15
F	Calochortus nuttallii	-	1	1	-	1	.00
F	Collinsia parviflora (a)	-	152	-	-	53	2.54
F	Crepis acuminata	-	*25	2	-	10	.15
F	Epilobium paniculatum (a)	-	8	-	-	4	.02
F	Erigeron eatonii	91	82	27	48	41	1.14
F	Eriogonum racemosum	70	*19	28	29	10	.10
F	Eriogonum umbellatum	-	4	2	-	2	.03
F	Frasera speciosa	-	-	3	-	-	-
F	Galium boreale	-	*8	-	-	4	.07
F	Gilia latifolia	-	-	1	-	-	-
F	Hackelia patens	56	*18	32	27	9	.37
F	Heuchera parvifolia	2	-	2	1	-	-
F	Lathyrus brachycalyx	60	*21	34	27	9	.45
F	Lappula occidentalis (a)	-	29	-	-	14	.41
F	Lomatium spp.	-	4	-	-	2	.01
F	Lupinus argenteus	23	19	14	12	8	.55
F	Machaeranthera canescens	8	*-	14	6	-	.01
F	Microsteris gracilis (a)	-	95	-	-	34	1.41
F	Pedicularis centranthera	3	-	5	1	-	-
F	Petradoria pumila	9	18	8	4	9	.71
F	Phlox austromontana	79	63	28	32	24	1.04
F	Polygonum douglasii (a)	-	38	-	-	16	.08
F	Senecio multilobatus	3	-	11	3	-	-
F	Silene douglasii	8	*-	2	5	-	-
F	Taraxacum officinale	14	18	-	6	8	.13

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'92	'98	'82	'92	'98	
F	Unknown forb perennial	-	-	3	-	-	-
Total for Annual Forbs		0	322	0	0	121	4.47
Total for Perennial Forbs		465	349	232	222	158	5.96
Total for Forbs		465	671	232	222	279	10.44

\* Indicates significant difference at  $\alpha = 0.10$  (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 35

Type	Species	Strip Frequency '98	Average Cover % '98
B	Abies concolor	2	-
B	Amelanchier utahensis	4	-
B	Artemisia tridentata vaseyana	75	6.40
B	Cercocarpus ledifolius	18	7.19
B	Chrysothamnus parryi	3	-
B	Eriogonum microthecum	75	4.66
B	Mahonia repens	2	.15
B	Opuntia spp.	11	.01
B	Pachistima myrsinites	4	.00
B	Pinus edulis	4	.15
B	Purshia tridentata	3	-
B	Quercus gambelii	7	.03
B	Symphoricarpos oreophilus	30	2.00
Total for Browse		238	20.61

#### CANOPY COVER --

Herd unit 30 , Study no: 35

Species	Percent Cover '98
Cercocarpus ledifolius	30
Pinus edulis	1

BASIC COVER --

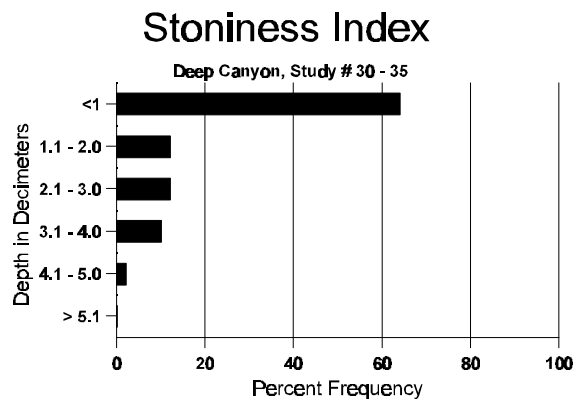
Herd unit 30 , Study no: 35

Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	343	3.75	7.75	36.31
Rock	249	9.00	12.25	23.92
Pavement	243	1.50	17.00	11.67
Litter	373	44.50	46.00	31.70
Cryptogams	28	.25	.50	.47
Bare Ground	250	41.00	16.50	20.27

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 35, Study Name: Deep Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.5	51.4 (16.5)	5.8	68.0	17.4	14.6	3.35	12.1	163.2	.5



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 35

Type	Quadrat Frequency '98
Sheep	1
Rabbit	1
Deer	26
Cattle	4

## BROWSE CHARACTERISTICS --

Herd unit 30, Study no: 35

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Abies concolor																	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'82		00%			00%			00%									
'92		00%			00%			00%			- 9%						
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-		
												'92	66		-		
												'98	60		-		
Amelanchier utahensis																	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	1	-	-	-	-	-	-	2	-	-	-	40		2
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	-	1	-	1	-	-	-	-	-	2	-	-	-	40	26	21
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'82		00%			00%			00%									
'92		00%			00%			00%									
'98		20%			20%			20%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%		
												'92	0		0%		
												'98	100		20%		

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	12	-	-	4	-	-	-	-	-	16	-	-	-	1066		16	
	98	39	-	-	-	-	-	-	-	-	39	-	-	-	780		39	
Y	82	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	92	14	1	-	1	-	-	3	-	-	16	2	1	-	1266		19	
	98	40	2	-	-	-	-	-	-	-	42	-	-	-	840		42	
M	82	9	-	-	-	-	-	-	-	-	9	-	-	-	600	19	27	
	92	11	2	1	1	-	-	-	-	-	14	-	1	-	1000	20	26	
	98	106	9	2	-	-	-	-	-	-	111	-	6	-	2340	22	30	
D	82	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	92	2	4	-	-	-	-	-	-	-	5	-	1	-	400		6	
	98	14	2	-	-	-	-	-	-	-	15	-	-	1	320		16	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+53%							
'92		18%			03%			08%			+24%							
'98		07%			01%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1266	Dec:	26%			
												'92	2666		15%			
												'98	3500		9%			
Cercocarpus ledifolius																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	98	9	1	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	82	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	92	4	-	1	-	-	-	-	-	-	5	-	-	-	333		5	
	98	4	1	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	82	6	4	-	-	-	-	-	-	-	8	2	-	-	666	40	42	
	92	1	-	9	-	1	-	-	-	-	11	-	-	-	733	57	35	
	98	2	3	2	5	-	-	-	3	-	15	-	-	-	300	102	101	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		31%			00%			00%			+28%							
'92		11%			56%			00%			-65%							
'98		24%			10%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	866	Dec:	0%			
												'92	1199		11%			
												'98	420		5%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus parryi																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	-	-	-	-	-	-	-	1	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	1	-	-	-	-	-	-	-	-	-	1	-	-	66	21	22	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	3	1	-	-	-	-	-	-	-	-	4	-	-	80	6	7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			100%			00%			+34%							
'98		20%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	-			
												'92	66		-			
												'98	100		-			
Eriogonum microthecum																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	60		3	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	21	2	-	1	-	-	4	-	-	28	-	-	-	1866		28	
	98	31	2	-	-	-	-	-	-	-	33	-	-	-	660		33	
M	82	31	3	-	-	-	-	-	-	-	34	-	-	-	2266	9	18	
	92	23	20	3	1	15	-	2	-	-	62	-	2	-	4266	7	8	
	98	175	37	-	-	-	-	-	-	-	212	-	-	-	4240	7	12	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	1	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		09%			00%			00%			+63%							
'92		41%			03%			02%			-21%							
'98		16%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	2266	Dec:	0%			
												'92	6198		1%			
												'98	4920		0%			
Mahonia repens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	9	-	-	-	-	-	-	-	-	-	9	-	-	180	5	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	180		-			
Opuntia spp.																		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133	4	5	
	92	3	-	-	1	-	-	-	-	-	4	-	-	-	266	7	9	
	98	7	-	-	1	-	-	-	-	-	8	-	-	-	160	6	21	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	-	1	66		1	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+67%							
'92		00%			00%			17%			-45%							
'98		00%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	0%			
												'92	398		17%			
												'98	220		9%			
Pachistima myrsinites																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	4	-	-	1	-	-	-	-	-	5	-	-	-	100	5	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	120		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Pinus edulis																	
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	2	-	-	-	-	-	-	-	-	-	2	-	-	-	40	2
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	-	60	3
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'82		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-		
												'92	0		-		
												'98	80		-		
Purshia tridentata																	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	2	-	-	-	-	-	-	-	-	-	2	-	-	-	40	2
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	4	-	-	-	-	-	-	-	-	-	4	-	-	-	80	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'82		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-		
												'92	0		-		
												'98	120		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	-	1	-	1	-	133	2	
	98	6	-	-	-	-	-	-	-	-	-	6	-	-	-	120	6	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	1	-	-	-	2	-	-	-	133	2	
	98	17	-	-	-	-	-	1	-	-	-	18	-	-	-	360	18	
M	82	-	-	9	-	-	-	-	-	-	-	9	-	-	-	600	12 5 9	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- - 0		
	98	5	-	-	-	-	-	-	-	-	-	5	-	-	-	100	59 61 5	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20	1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		Moderate Use			Heavy Use			Poor Vigor			%Change							
'82		00%			100%			00%			-78%							
'92		00%			00%			00%			+72%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	600	Dec:	0%			
												'92	133		0%			
												'98	480		4%			
Symphoricarpos oreophilus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	6	-	-	-	-	-	-	-	-	-	6	-	-	-	400	6	
	98	9	-	-	-	-	-	-	-	-	-	9	-	-	-	180	9	
Y	82	3	-	-	-	-	-	-	-	-	-	3	-	-	-	200	3	
	92	6	-	-	2	-	1	-	-	-	-	9	-	-	-	600	9	
	98	14	-	-	1	-	-	-	-	-	-	15	-	-	-	300	15	
M	82	5	7	-	-	-	-	-	-	-	-	12	-	-	-	800	22 24 12	
	92	4	-	1	-	-	5	-	-	-	-	10	-	-	-	666	20 26 10	
	98	26	7	-	1	-	-	-	-	-	-	34	-	-	-	680	13 28 34	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	1	1	-	-	-	-	2	-	-	-	133	2	
	98	7	-	-	-	-	-	-	-	-	-	7	-	-	-	140	7	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		Moderate Use			Heavy Use			Poor Vigor			%Change							
'82		47%			00%			00%			+29%							
'92		05%			38%			00%			-20%							
'98		13%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1000	Dec:	0%			
												'92	1399		10%			
												'98	1120		13%			

Trend Study 30-37-98

Study site name: Truman Bench .

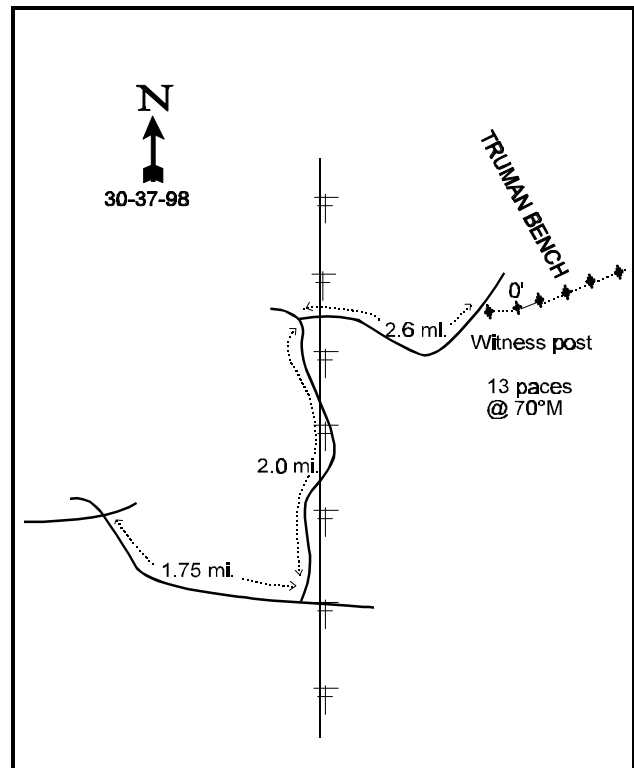
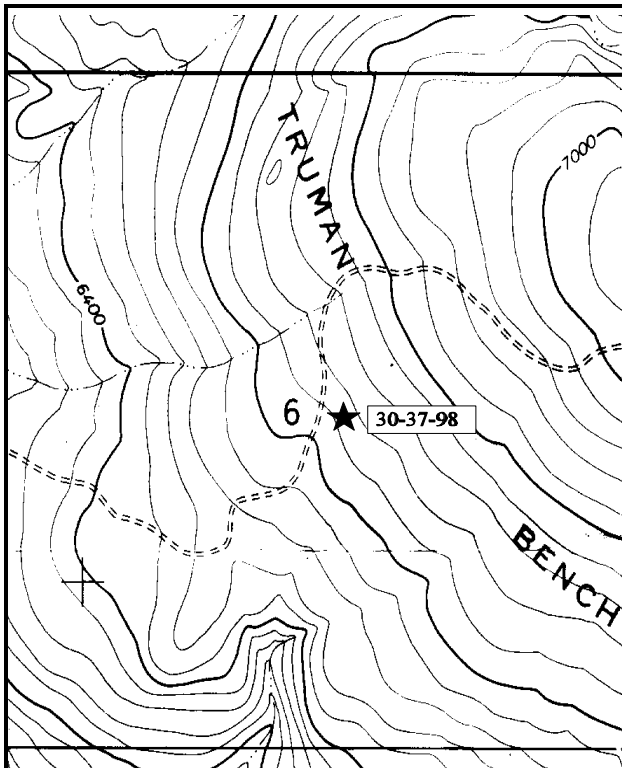
Range type: Sagebrush-Grass .

Compass azimuth: frequency baseline 80 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (14 & 86ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Veyo, proceed south 3.8 miles, at which point a road takes off to the east. Proceed east on this road for approximately 2.75 miles to a fork in the road. Take the right fork for an additional 1.75 miles to another fork. Take the left fork which passes under the powerline. Follow the powerline for approximately 2.0 miles. At this point the road comes to 'T'. Go right (east). Proceed on this road for 2.6 miles passing a Forest Service boundary fence and an old sheep pen on the right. Stay on the main road ignoring side roads. There is a witness post on the right side of the road. From the witness post the 0-foot stake is 13 paces at 70°M. The 0 foot baseline is found in a rock monument on the right side of the road and the stake is marked by browse tag #7011.



Map Name: Saddle Mountain

Diagrammatic Sketch

Township 40S , Range 15W , Section 6 .

UTM 4135406.965 N, 271861.498 E

## DISCUSSION

### Trend Study No. 30-37 (50B-14)

The Truman Bench trend study is within deer winter range on Truman Bench. Deer reportedly use the area in early spring, late fall, and during mild winters. The study site is on a 10% west facing slope with an elevation of 6,700 feet. The community type is sagebrush-grass with substantial components of antelope bitterbrush, Stansbury cliffrose, and Utah serviceberry. Utah juniper trees are sparsely scattered throughout the area at an estimated density of 38 trees/acre in 1998 using point quarter data. Average basal diameter is 5.6 inches. There has been no livestock grazing in this area since the 1960's. Deer days use/acre measured at a nearby pellet group transect has averaged 58 between 1982 and 1992, with a high of 79 in 1989-90, and a low of 30 in 1991-92 (Jense et al. 1992). Pellet group data from the site taken in 1998 estimate 38 deer days use/acre.

Soil on Truman Bench is very distinctive. The entire area is an old lava flow that has weathered to produce ground surface that is uniformly covered by fractured basalt rocks ranging from pavement size to as large as two feet in diameter. Soil depth is deep, however the estimated effective rooting depth (see methods) is 21 inches. Texture is a clay loam with a moderately acid pH (6.0). Phosphorus may be limiting at only 3.8 ppm when 10 ppm is thought to be the minimum for normal plant development. Soil drainage is very rapid and there is little evidence of erosion, but pedestaling was reported around some shrubs.

Browse composition is highly favorable with several preferred species present including: Utah serviceberry, mountain big sagebrush, Stansbury cliffrose, and antelope bitterbrush. Mountain big sagebrush is by far the most abundant shrub which currently ('98) provides 50% of the total shrub cover. Density has declined from a high of 6,199 plants/acre estimated in 1982, to 5,866 by 1992, and 3,620 by 1998. Most of the decline between 1992 and 1998 is due to the much larger sample taken in 1998. The dead within the population can only explain 37% of the decrease. The much larger sample gives more accurate estimates for shrubs with discontinuous and/or clumped distributions. Utilization of the sagebrush was moderate to heavy in 1992, but is mostly light to moderate in 1998. Vigor remains normal and percent decadence relatively low at only 14%. Reproduction is good with good numbers of seedlings and young plants counted during each reading. Currently, dead plants number 820 plants/acre.

Cliffrose and bitterbrush have relatively small, but somewhat stable populations which received heavy use in 1992. Current use is more moderate, vigor normal, with no decadent plants sampled in 1998. Serviceberry follows a similar trend. Density has increased 98% since 1992, mostly due to the lengthening of the baseline in 1998 which provides a much better, more representative sample. Some Gambel oak was also picked up in the larger sample.

Herbaceous vegetation is sparse because of the poor surface soil and excessively rapid drainage, combined with high surface temperatures. Mutton bluegrass dominates the herbaceous understory by producing 92% of the grass cover and 74% of the total herbaceous cover. Bottlebrush squirreltail is also fairly common. Forbs are very diverse with 16 perennial species encountered in 1992, and 21 in 1998. All of the forbs found in 1998 combine to produce only 3.4% cover with Hood's phlox providing 50% of that cover. The only other fairly common perennial species include: bull thistle, pale agoseris, and foothill deathcamas.

### 1982 APPARENT TREND ASSESSMENT

Over the short term, soil trend appears fairly stable. The broken rocky surface, more than any other factor, tends to prevent runoff. Over the very long term, soil is in a formation mode. That is to say that, as the parent rock weathers and is broken down by climatic and vegetative action, more "soil" will be created. This, in turn, should provide greater growth opportunities, especially for grasses and forbs. Vegetative trend is currently stable. If cattle grazing is restricted or excluded, a very slow improvement in herbaceous growth can be expected. The character of the soil is a paramount management factor on this site.

## 1992 TREND ASSESSMENT

No soil movement was noted with an improving soil trend on the site. The little soil that is there seems to be adequately covered by vegetation and litter. Most browse species on the site are good for wildlife use in the winter and are stable to slightly increasing. Two species that should be monitored for excessive increases are threadleaf snakeweed and dwarf rabbitbrush.

### TREND ASSESSMENT

soil - up

browse - slightly up

herbaceous understory - up

## 1998 TREND ASSESSMENT

Trend for soil is stable with similar amounts of exposed bare ground compared to 1992. Percent litter cover did decline, while rock and pavement cover combined increased from 42% to 57%. Erosion does not appear to be a problem however. Trend for browse is stable for the preferred species, mountain big sagebrush, serviceberry, cliffrose, and bitterbrush. These shrubs generally show lighter use when compared to 1992. Vigor is good, percent decadence low, with adequate reproduction. Most of the changes in density are due to the larger sample used in 1998 which picked up more serviceberry and Gambel oak. Trend for the herbaceous understory is down slightly, due to a decline in the sum of nested frequency of grasses and forbs. Nested frequency of bottlebrush squirreltail and prairie Junegrass declined significantly since 1992, while the more common mutton bluegrass remained at a similar frequency.

### TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - down slightly

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 37

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron smithii	-	3	-	-	1	.00
G	Koeleria cristata	60	*19	3	24	9	.33
G	Poa fendleriana	207	231	50	76	86	12.77
G	Sitanion hystrix	171	*64	54	78	28	.76
G	Stipa comata	-	4	-	-	1	.03
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		438	321	107	178	125	13.91
Total for Grasses		438	321	107	178	125	13.91
F	Agoseris glauca	22	37	-	11	18	.25
F	Allium spp.	-	3	-	-	2	.01
F	Arabis spp.	6	-	2	3	-	-
F	Aster spp.	-	2	-	-	1	.00

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82 '98	'92	'08	
F	Astragalus spp.	17	*3	7	10	2	.02
F	Castilleja chromosa	1	3	1	1	3	.02
F	Calochortus nuttallii	2	3	-	1	1	.00
F	Cirsium vulgare	27	17	1	10	8	.26
F	Comandra pallida	-	*10	-	-	5	.07
F	Collinsia parviflora (a)	-	25	-	-	13	.06
F	Cryptantha spp.	-	2	-	-	2	.01
F	Cymopterus spp.	-	1	-	-	1	.03
F	Draba spp. (a)	-	3	-	-	1	.00
F	Erodium cicutarium (a)	-	3	-	-	2	.01
F	Erigeron pumilus	19	*4	2	9	2	.01
F	Eriogonum umbellatum	7	9	3	3	5	.05
F	Ipomopsis aggregata	-	4	-	-	1	.00
F	Lomatium spp.	-	13	-	-	5	.02
F	Lotus utahensis	16	-	4	10	-	-
F	Lupinus argenteus	-	4	-	-	2	.01
F	Machaeranthera canescens	-	3	-	-	1	.00
F	Microsteris gracilis (a)	-	109	-	-	47	.38
F	Penstemon leonardi	78	*-	45	33	-	-
F	Penstemon palmeri	1	1	3	1	1	.15
F	Phlox hoodii	21	*40	10	11	17	1.70
F	Phlox longifolia	-	1	-	-	1	.00
F	Polygonum douglasii (a)	-	2	-	-	1	.00
F	Ranunculus spp.	-	3	-	-	2	.01
F	Senecio multilobatus	2	-	1	1	-	-
F	Trifolium spp.	1	-	-	1	-	-
F	Viguiera multiflora	1	-	-	1	-	-
F	Zigadenus paniculatus	3	*22	-	2	10	.26
Total for Annual Forbs		0	142	0	0	64	0.46
Total for Perennial Forbs		224	185	79	108	90	2.92
Total for Forbs		224	327	79	108	154	3.39

\* Indicates significant difference at % = 0.10 (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 37

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	23	5.11
B	Artemisia tridentata vaseyana	82	14.47
B	Chrysothamnus depressus	46	2.17
B	Chrysothamnus parryi howardi	2	.30
B	Cowania mexicana stansburiana	6	2.75
B	Echinocereus spp.	1	-
B	Gutierrezia microrcephala	20	.04
B	Juniperus osteosperma	1	1.25
B	Opuntia spp.	4	.06
B	Purshia tridentata	14	2.01
B	Quercus gambelii	5	.56
Total for Browse		204	28.77

## CANOPY COVER --

Herd unit 30 , Study no: 37

Species	Percent Cover '98
Juniperus osteosperma	1

## BASIC COVER --

Herd unit 30 , Study no: 37

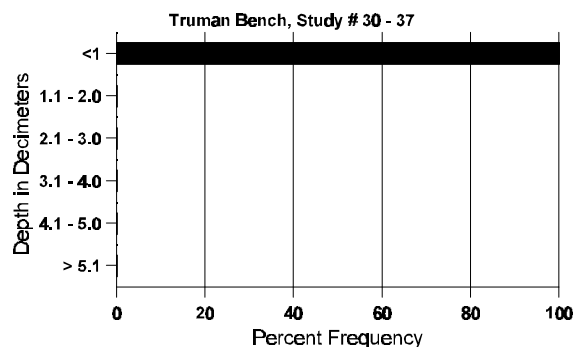
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	317	6.25	11.25	41.11
Rock	340	31.25	25.00	44.12
Pavement	223	16.75	16.75	12.56
Litter	359	41.75	42.50	29.03
Cryptogams	3	1.00	0	.00
Bare Ground	169	3.00	4.50	4.48

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 37, Study Name: Truman Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
21.0	40.6 (17.7)	6.0	32.0	36.6	31.4	3.1	3.8	121.6	.5

# Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 37

Type	Quadrat Frequency '98
Rabbit	1
Elk	1
Deer	23

## BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 37

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	15	2	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	82	-	4	-	-	-	-	-	-	-	4	-	-	-	266	41 33	4	
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	66	55 91	1	
	98	114	44	12	3	-	-	-	-	-	173	-	-	-	3460	51 43	173	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	540			27	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			100%			00%			-75%							
		'92			00%			100%			+98%							
		'98			24%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	266	Dec:	-			
												'92	66		-			
												'98	3800		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	82	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	98	114	-	-	-	-	-	-	-	-	114	-	-	-	2280		114	
Y	82	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	92	3	7	5	1	1	1	3	-	-	21	-	-	-	1400		21	
	98	23	2	-	1	-	-	-	-	-	26	-	-	-	520		26	
M	82	85	-	-	-	-	-	-	-	-	85	-	-	-	5666	15	23	85
	92	10	16	12	2	4	4	3	-	-	50	1	-	-	3400	17	26	51
	98	68	51	3	5	2	-	-	-	-	125	4	-	-	2580	15	29	129
D	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	3	2	5	-	2	4	-	-	-	13	-	3	-	1066		16	
	98	9	16	1	-	-	-	-	-	-	20	-	-	6	520		26	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	1	-	-	-	820		41	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			- 5%							
'92		36%			35%			03%			-38%							
'98		39%			02%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	6199	Dec:	2%			
												'92	5866		18%			
												'98	3620		14%			
Chrysothamnus depressus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	98	71	-	-	-	-	-	-	-	-	71	-	-	-	1420		71	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	6	-	-	3	-	-	9	-	-	18	-	-	-	1200	11	13	18
	98	279	-	-	-	-	-	-	-	-	279	-	-	-	5580	4	7	279
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+79%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	1466		14%			
												'98	7020		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysanthamnus parryi howardi																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	1	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	1	-	-	-	-	-	-	-	-	-	1	-	20	20	46	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	40		-			
Cowania mexicana stansburiana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	1	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	41	47	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	66	102	93	
	98	2	4	1	-	1	-	-	-	-	8	-	-	-	160	50	52	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+50%							
'92		00%			50%			00%			+27%							
'98		67%			11%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	0%			
												'92	132		50%			
												'98	180		0%			
Echinocereus spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia microrcephala																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	-	2	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	-	-	4	-	-	80		4	
M	82	3	-	-	-	-	-	-	-	-	3	-	-	-	200	8 13	3	
	92	7	-	-	-	-	-	3	-	-	10	-	-	-	666	8 9	10	
	98	42	-	-	4	-	-	-	-	-	46	-	-	-	920	4 6	46	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+70%							
'92		00%			00%			00%			+33%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	200	Dec:	-			
												'92	666		-			
												'98	1000		-			
Juniperus osteosperma																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			00%			00%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	-			
												'92	66		-			
												'98	20		-			
Opuntia spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	5 12	4	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	100		20%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	82	8	-	-	-	-	-	-	-	-	8	-	-	-	533	35	43	
	92	-	1	7	-	-	-	-	-	-	8	-	-	-	533	37	52	
	98	2	7	5	-	-	1	-	-	-	15	-	-	-	300	28	54	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	3	-	-	-	-	-	-	3	-	-	-	200		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+33%							
'92		17%			83%			00%			-57%							
'98		47%			35%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	533	Dec:	0%			
												'92	799		25%			
												'98	340		0%			
Quercus gambelii																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	42	-	-	-	-	-	-	-	-	42	-	-	-	840	25	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	900		-			

Trend Study 30-38-98

Study site name: Wide Canyon .

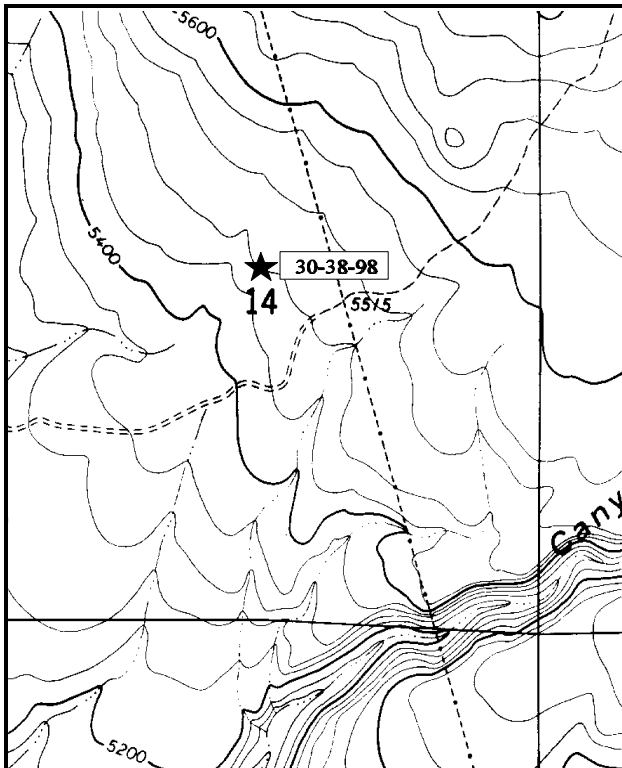
Range type: Mountain Brush .

Compass azimuth: frequency baseline 276 M degrees. (Line 4 228°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (8 & 85ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

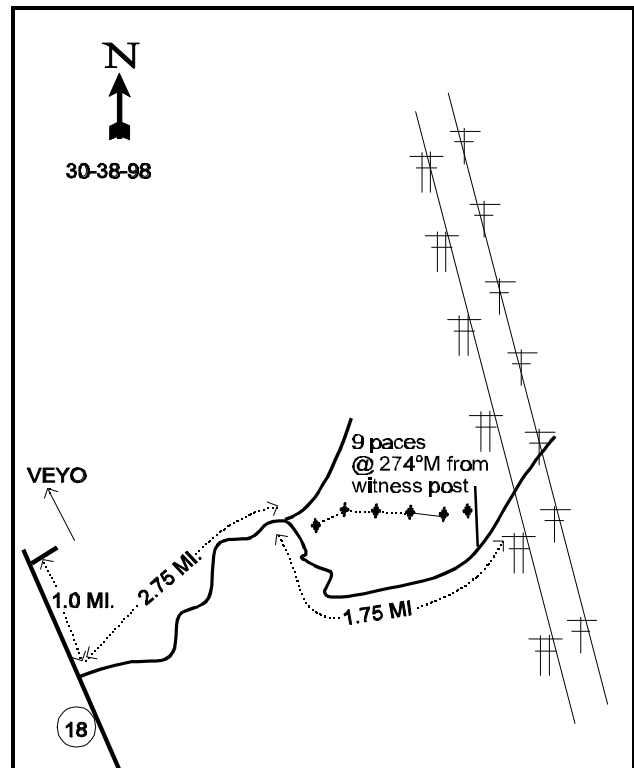
LOCATION DESCRIPTION

From the town of Veyo, proceed south 3.8 miles, at which point a road takes off to the east. Proceed east on this road for approximately 2.75 miles to a fork in the road. Take the right fork for an additional 1.75 miles to the point where the road crosses under power lines. At this point there is a road going north. The witness post is about 100 yards down this road. From the witness post the 0-foot stake is 9 paces at 274°M. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height. Line 3 is only 90 feet long.



Map Name: Saddle Mountain

Township 40S , Range 16W , Section 14 .



Diagrammatic Sketch

UTM 4132031.477 N, 268400.893 E

## DISCUSSION

### Trend Study No. 30-38 (50B-15)

The Wide Canyon range study is located on deer winter range at 5,500 feet on the north side of Wide Canyon. The study site slopes gently (3-5%) to the southwest. Vegetational characteristics of the community are essentially two-tiered. There is a scattered overstory of Utah juniper and large tree-like Stansbury cliffrose underlain by a rather sparse cover of lower growing shrubs and a dense carpet of cheatgrass brome. Perennial grasses and forbs are nearly nonexistent. Deer days use/acre, estimated on a nearby pellet group transect, averaged 23 over the last ten years (1982-92), with a high of 39 in 1989-90, and a low of 14 in 1991-92. Pellet group data taken along the study site baseline in 1998 estimate a much higher level of use at 121 deer days use/acre. A few cattle pats were also encountered.

This study is located on the same lava flow on which the Truman Bench study resides, but approximately three miles further away and 1,200 feet lower in elevation. On this site, there are still many variable sized basalt rocks littering the ground surface. However, these are interspersed with larger areas occupied by smaller size fragments. Much of this finer material has probably been deposited through sedimentation from above. Effective rooting depth (see methods) is estimated at almost 17 inches. Soil texture is a clay loam with a slightly acid pH (6.5). Bare ground has increased slightly from 11% in 1982, to 15% in 1992 and 1998. There were a large number of lichens and moss on the ground during the 1992 reading. Erosion is not a problem on this site due to the level terrain, combined with adequate protective ground cover.

The key browse species are mountain big sagebrush and Stansbury cliffrose. Sagebrush currently ('98) accounts for 19% of the browse cover with a cover value of just over 4%. Density has increased from 799 plants/acre, to 1,599 in 1992, and 1,560 by 1998. These plants have displayed moderate to heavy use during past readings, but mostly light to moderate use in 1998. Reproduction was good in 1992 with excellent seed production. By 1998, recruitment is still adequate but seed production is poor. The cliffrose plants are principally large tree-like forms which are at least partially unavailable because of height. Utilization of the available portion is moderate to heavy. Since there are no dead plants sampled in 1998, the decline in density since 1992 is primarily due to the much larger sample giving more accurate population estimates. This sample better estimates shrub populations which often have aggregated and/or discontinuous populations. Green ephedra is also moderately abundant and provides additional forage for wintering deer.

The most abundant browse is broom snakeweed which currently provides ('98) 16% of the browse cover. The broom snakeweed population increased 16% from 3,265 plants/acre in 1982 to 3,899 plants/acre by 1992. Seedlings were very abundant in 1992 (30,033 plants/acre) due to the wet spring. Most of these plants did not survive, but the population did increase to 7,400 plants/acre by 1998. Currently, seedlings and young are found in small numbers with 93% of the population consisting of mature plants.

Large juniper trees are found throughout the site. They account for 40% of the total browse cover and have an estimated overhead canopy cover value of 17%. Point quarter data from 1998 estimate 34 juniper trees/acre with an average basal diameter of 12.4 inches.

The herbaceous understory is very poor and perennial grasses and forbs are quite rare. Cheatgrass brome is very abundant, but was not counted prior to the 1998 reading because it is an annual. During the 1998 reading, cheatgrass produced a cover value of 23% which made up 99% of the total grass cover. A few perennial grasses including galleta, Indian ricegrass, and bottlebrush squirreltail are occasionally found. Forbs combine to produce only 1.5% cover. The most common species are annuals.

## 1982 APPARENT TREND ASSESSMENT

Soil is a limiting factor on this site. Current soil condition is fair to poor and not noticeably improving. Although the rate of erosion is not great, it is probably enough to prevent any immediate improvement. Trend is therefore stable or declining. Vegetative trend is also stable or declining. The key browse species are rather static with little evidence of reproduction, but also little decadence. However, sagebrush vigor is below optimum. Broom snakeweed and cheatgrass brome are both overly abundant and show few signs of becoming less so.

## 1992 TREND ASSESSMENT

Vegetative basal cover has remained the same at 1%, which is extremely low. The vegetative cover would undoubtedly be higher if cheatgrass brome were counted. Rock and pavement combined have increased slightly from 32% cover to 39% cover. Litter cover has decreased from 55% to 41%. Overall, soil is not eroding and the changes in cover are slight, indicating a stable soil trend. Grass and forb species are slightly increasing and are not utilized much on this site. Browse density has increased by 24%, due mostly to broom snakeweed and mountain big sagebrush. The increase in mountain big sagebrush is encouraging, but the increase in broom snakeweed should be monitored. Broom snakeweed has the possibility of greatly expanding, depending on the survival rate of the seedlings. Browse trend is slightly up.

### TREND ASSESSMENT

soil - stable

browse - slightly up

herbaceous understory - stable, but very poor

## 1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1992. Trend for browse is down for mountain big sagebrush and stable for cliffrose. However, sagebrush makes up 19% of the browse cover, or more realistically, 80% of the preferred browse cover. Sagebrush remained at a similar density of about 1,560 plants/acre, but 43% of the sagebrush are dead. The dead are not counted in the population estimate. Utilization is lighter and reproduction appears adequate to maintain the population. Percent decadency has increased from 8% in 1982, to 19% in 1992, and 29% by 1998. In addition, 61% (280 plants/acre) of the decadent sagebrush were classified as dying. However, reproduction appears adequate to maintain the current population. A question arises, is this adequate? Density of cliffrose declined apparently due to the much larger sample used in 1998. Utilization is moderate to heavy on available plants, vigor is normal and there are currently no plants classified as decadent. Another negative aspect of the browse trend is the 47% increase in the density of broom snakeweed from 3,899 to 7,400 plants/acre. Most of the plants are mature (93%) indicating a possibly stabile population. Trend for the herbaceous understory is down. Perennial grasses and forbs are lacking and both have declined in sum of nested frequency since 1992. The herbaceous understory is totally dominated by cheatgrass which has a cover value of 23%. It actually accounts for 99% of the grass cover and 93% of the total herbaceous cover.

### TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - down and dominated by cheatgrass

HERBACEOUS TRENDS --

Herd unit 30 , Study no: 38

T y p e	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron spp.	9	-	-	3	-	-
G	Bromus tectorum (a)	-	348	-	-	98	23.06
G	Hilaria jamesii	-	3	5	-	3	.06
G	Oryzopsis hymenoides	-	2	-	-	1	.00
G	Poa fendleriana	13	*-	1	6	-	-
G	Poa secunda	22	*-	-	9	-	-
G	Sitanion hystrix	12	14	12	7	7	.11
G	Vulpia octoflora (a)	-	17	-	-	9	.09
Total for Annual Grasses		0	365	0	0	107	23.15
Total for Perennial Grasses		56	19	18	25	11	0.18
Total for Grasses		56	384	18	25	118	23.34
F	Agoseris glauca	3	-	-	2	-	-
F	Alyssum alyssoides (a)	-	2	-	-	1	.00
F	Calochortus nuttallii	9	9	-	3	5	.05
F	Draba spp. (a)	-	28	-	-	13	.16
F	Erodium cicutarium (a)	-	38	-	-	18	.39
F	Lupinus argenteus	-	2	-	-	2	.04
F	Microsteris gracilis (a)	-	65	-	-	26	.30
F	Plantago patagonica (a)	-	30	-	-	12	.47
F	Sphaeralcea grossulariaefolia	8	*-	2	4	-	-
F	Thysanocarpus curvipes	-	2	-	-	2	.03
F	Unknown forb-annual (a)	-	2	-	-	2	.03
Total for Annual Forbs		0	165	0	0	72	1.37
Total for Perennial Forbs		20	13	2	9	9	0.12
Total for Forbs		20	178	2	9	81	1.50

\* Indicates significant difference at  $\alpha = 0.10$  (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 38

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata vaseyana</i>	42	4.34
B	<i>Cowania mexicana stansburiana</i>	6	1.17
B	<i>Ephedra viridis</i>	21	4.46
B	<i>Gutierrezia sarothrae</i>	76	3.73
B	<i>Juniperus osteosperma</i>	5	9.19
B	<i>Prunus fasciculata</i>	1	.15
B	<i>Yucca baccata</i>	1	-
Total for Browse		152	23.05

## CANOPY COVER --

Herd unit 30 , Study no: 38

Species	Percent Cover '98
<i>Juniperus osteosperma</i>	17

## BASIC COVER --

Herd unit 30 , Study no: 38

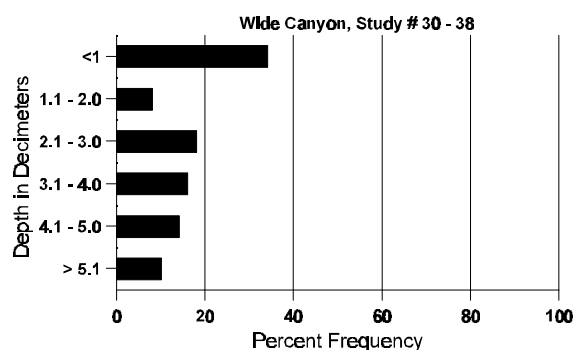
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	361	1.00	.75	45.48
Rock	266	21.00	28.25	23.15
Pavement	194	11.00	10.75	6.17
Litter	381	55.00	41.00	44.79
Cryptogams	69	1.00	4.00	1.56
Bare Ground	243	11.25	15.25	14.72

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 38, Study Name: Wide Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.6	49.0 (17.7)	6.5	40.0	33.4	26.6	1.4	11.1	150.4	.6

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 38

Type	Quadrat Frequency '98
Rabbit	12
Deer	45

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 38

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.	Total				
		1	2	3	4	5	6	7	8	9				1	2	3	4
Artemisia tridentata vaseyana																	
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	9	-	-	-	-	-	-	-	-	9	-	-	-	300		9
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3
Y	82	1	-	-	-	-	-	-	-	-	-	1	-	-	33		1
	92	2	18	-	-	2	-	-	-	-	21	1	-	-	733		22
	98	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17
M	82	14	5	2	-	-	-	-	-	-	11	10	-	-	700	22 26	21
	92	3	10	4	-	-	-	-	-	-	17	-	-	-	566	19 23	17
	98	22	12	2	2	-	-	-	-	-	38	-	-	-	760	17 24	38
D	82	1	-	1	-	-	-	-	-	-	-	-	-	2	66		2
	92	2	1	2	2	2	-	-	-	-	6	-	3	-	300		9
	98	17	6	-	-	-	-	-	-	-	9	-	-	14	460		23
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1240		62
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
		'82			21%			13%			08%			+50%			
		'92			69%			13%			06%			- 2%			
		'98			23%			03%			18%						
Total Plants/Acre (excluding Dead & Seedlings)												'82	799	Dec:	8%		
												'92	1599		19%		
												'98	1560		29%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cowania mexicana stansburiana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	1	-	-	-	-	-	-	-	-	4	-	-	133		4	
	98	5	-	-	-	-	-	-	-	-	-	5	-	-	100		5	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	1	1	1	-	-	-	-	-	-	5	-	1	200		6	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	4	7	2	-	1	-	-	-	-	-	14	-	-	466	32	31	
	92	1	2	-	-	-	-	-	-	-	-	3	-	-	100	33	29	
	98	-	2	2	-	-	-	-	-	1	-	5	-	-	100	85	85	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	3	-	-	-	-	5	-	-	166		5	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		57%			14%			00%			+ 0%							
'92		21%			29%			07%			-74%							
'98		33%			33%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	466	Dec:	0%			
												'92	466		36%			
												'98	120		0%			
Ephedra viridis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	-	3	-	-	100		3	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	6	-	-	-	-	-	-	-	-	-	6	-	-	200	24	26	
	92	3	3	-	-	-	-	-	-	-	-	6	-	-	200	24	36	
	98	16	3	2	1	-	-	-	-	-	-	21	1	-	440	34	40	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+33%							
'92		33%			00%			00%			+38%							
'98		13%			08%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	200	Dec:	0%			
												'92	300		0%			
												'98	480		4%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia sarothrae																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	901	-	-	-	-	-	-	-	-	901	-	-	-	30033		901	
	98	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
Y	82	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8	
	92	14	-	-	-	-	-	-	-	-	14	-	-	-	466		14	
	98	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	82	85	-	-	-	-	-	-	-	-	85	-	-	-	2833	8	9	
	92	100	-	-	1	-	-	1	-	-	99	-	3	-	3400	13	12	
	98	342	-	-	2	-	-	-	-	-	344	-	-	-	6880	8	10	
D	82	5	-	-	-	-	-	-	-	-	-	-	-	5	166		5	
	92	1	-	-	-	-	-	-	-	-	-	-	-	1	33		1	
	98	13	-	-	-	-	-	-	-	-	7	-	-	6	260		13	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			05%			+16%							
'92		00%			00%			03%			+47%							
'98		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	3265	Dec:	5%			
												'92	3899		1%			
												'98	7400		4%			
Juniperus osteosperma																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	2	-	-	2	-	-	-	66		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	4	-	-	-	-	-	-	1	-	5	-	-	-	100	-	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			00%			00%			+76%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	33	Dec:	-			
												'92	33		-			
												'98	140		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Prunus fasciculata																		
M	'82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20	25	59
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:	-		
												'92		0		-		
												'98		20		-		
Yucca baccata																		
M	'82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20	33	45
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:	-		
												'92		0		-		
												'98		20		-		

Trend Study 30-40-98

Study site name: Telegraph Draw .

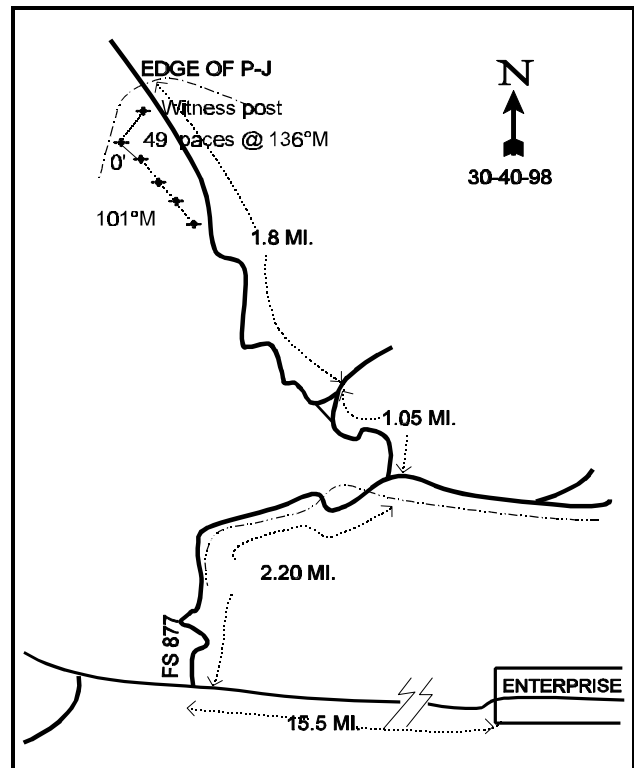
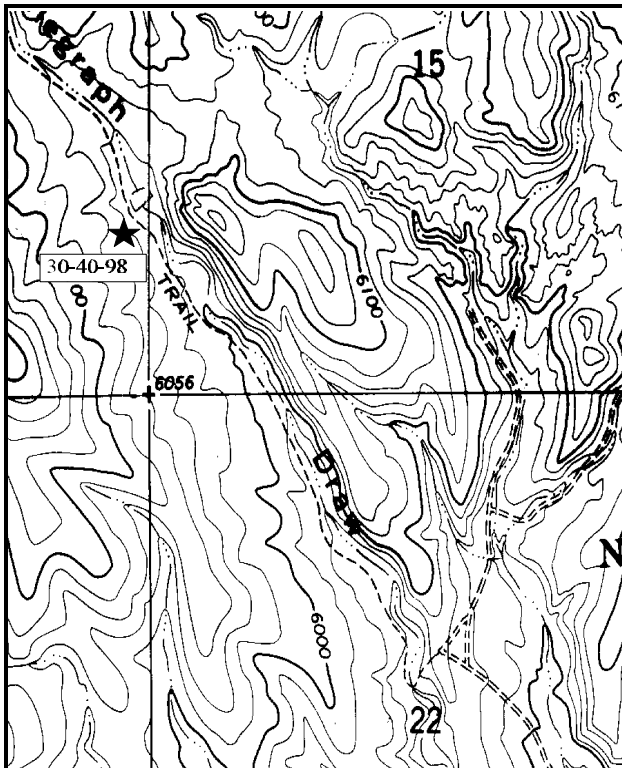
Range type: Chained, Reseeded P-J .

Compass azimuth: frequency baseline 101 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (14 & 81ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Center and Main in Enterprise, go west on the Shoal Creek road for 15.5 then turn right (north). Clover Valley road is 0.1 miles too far. Stay on the main road heading north for approximately 2.20 miles. At this point, there will be a fork in the road. Go to the left (i.e., north) for approximately 1.05 miles to a triangle of roads at the top of the ridge. Stay to the left on the road that goes down into the draw for 1.80 miles, at which point the road enters pinyon-juniper. Just as you come to the pinyon-juniper, stop at the witness post on the left side of the road. The 0-foot baseline stake is located 49 paces from the witness post at an azimuth of 154 degrees true. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.



Map Name: Mount Escalante

Diagrammatic Sketch

Township 36S , Range 19W , Section 16

UTM 4171913.568 N, 236959.122 E

## DISCUSSION

### Trend Study No. 30-40 (50B-3c)

The Telegraph Draw trend study is on winter range in Telegraph Draw. The area has been chained and seeded, however the long range success of the seeded species has been minimal and pinyon and juniper trees are still abundant. Elevation is approximately 6,080 feet with a 10% slope and southeast aspect. Vegetative cover on the study site is considerably improved over the surrounding pinyon-juniper woodland, but is still rather sparse and variably dispersed. The overall vegetative appearance is Wyoming big sagebrush interspersed with young pinyon and juniper trees. Deer use is primarily during the winter, however fresh pellet groups were observed during the summer of 1992. In addition, wild horses and stud piles were observed nearby, and fresh unshod pony tracks were encountered on the study site in 1992. This study is located in an area of the USFS Terryshoal Creek allotment that receives no use by livestock and is set aside for wild horses and burros. Use by either deer or horses appears light. Pellet group data taken on the site in 1998 estimate only 14 deer days use/acre. Days use/acre for wild horses is estimated at 22. Several wild horses were also seen near the site during the 1998 reading on May 29<sup>th</sup>.

Soil is relatively deep and rocky with an effective rooting depth (see methods) of 17 inches. Texture is a sandy clay with a moderately acid pH (5.6). The soil is sandy on the surface with a compacted clay layer encountered at a depth of 4 inches. Rocks, of a volcanic origin, are common on the surface. Some surface erosion has taken place, however active erosion has been greatly reduced from what occurs on untreated areas. Pinyon and juniper litter from downed and broken up trees is dispersed throughout. The association of litter and with the increased vegetation has tended to stabilize the site.

The key browse is a mixture of black sagebrush and Wyoming big sagebrush. During the 1982 reading, all sagebrush was classified as Wyoming big sagebrush, but in 1992 most of the sagebrush was identified as black sagebrush. Combined, the population nearly doubled from 6,166 plants/acre in 1982 to 11,830 by 1992. Sagebrush cover was estimated 15% in 1992. Wyoming big sagebrush and black sagebrush have expanding populations, but had only fair vigor due to an insect infestation in 1982. Combined sagebrush density declined to 4,560 plants/acre in 1998. Dead plants are rare suggesting that the change in density is mostly due to the much larger sample used in 1998 which better estimates shrub populations with clumped and/or discontinuous distributions. Overall, utilization is light to moderate, vigor good, and percent decadence low. Seedlings and young plants have been abundant during each reading. Biotic potential is currently high at 28% and 25% of the population consists of young plants.

Other preferred browse include a small population of antelope bitterbrush. Presumably, the bitterbrush were seeded after the chaining. These plants have shown moderate to heavy use, good vigor, and low decadence since 1982. Recruitment has steadily improved with increasing numbers of seedlings and young plants since 1992.

Increaser shrubs, including two species of rabbitbrush, and broom snakeweed are increasing on the site. In addition, pinyon and juniper trees have increased in density and stature. Point quarter data from 1998 estimate 160 singleleaf pinyon and 56 juniper trees/acre. Average basal diameter is 2.5 inches for pinyon and 3.6 inches for juniper. Shrub density strip data, which more effectively samples young and seedling trees, estimates a higher number of 380 pinyon and 140 juniper trees/acre.

The herbaceous understory is poor. Grasses are fairly diverse, yet they only produce 5% cover. Of that cover, cheatgrass provides 52% of the grass cover. The only common perennial grasses include: Indian ricegrass, mutton bluegrass, and bottlebrush squirreltail. Forbs outnumber grasses in abundance and species diversity. The principal species are desert phlox and rock goldenrod. Hooker balsamroot, bastard toadflax, and sulfur eriogonum are also fairly abundant. No seeded forbs were encountered or observed.

## 1982 APPARENT TREND ASSESSMENT

Overall, trend is improving. Considerable soil surface is exposed and potentially erodible, but much less so than in the surrounding pinyon-juniper woodland. Further stabilization, however is likely to be slow because of the amount of rock and pavement and the relatively poor grass cover. Vegetational trend is also improving, particularly with respect to the key species. Actual or potential deficiencies include (1) sparse grass density, (2) lack of seeded forbs, (3) scarcity of more preferred shrubs, and (4) the abundance of young pinyon and juniper trees.

## 1992 TREND ASSESSMENT

The soil trend appears to have improved since 1982. Basal vegetative cover has doubled since the last reading, while bare ground has decreased by 63%. However, combined rock and pavement cover have also doubled, indicating past surface erosion. Litter has remained stable. Total protective ground cover has increased from 73% to 90%. The trend for browse is also up. The key browse species, black sagebrush and Wyoming big sagebrush, have nearly doubled in density and have improved vigor. The herbaceous trend is stable. Grasses have increased slightly in quadrat frequency, while forbs have remained stable. Forbs are abundant and diverse but consist of poor forage species. No seeded forbs were encountered.

### TREND ASSESSMENT

soil - improved

browse - up

herbaceous understory - stable

## 1998 TREND ASSESSMENT

Trend for soil is down, due to an increase in percent bare ground from 10% to 20%, and a decline in litter cover from 58% to 51%. Trend for browse stable. Black sagebrush and Wyoming big sagebrush show a major decline in density from 11,830 plants/acre to 4,560. However, due to the lack of dead plants, it appears that the change is due mostly to the much larger sample used in 1998. Utilization, vigor, and percent decadency are similar to 1992 levels. Reproduction is also excellent with abundant seedlings and young. Bitterbrush is increasing. It has moderate use, good vigor, and low decadence. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses and forbs has remained similar to 1992 levels. Composition is poor however, with cheatgrass providing 52% of the grass cover, and rock goldenrod and desert phlox providing 51% of the forb cover.

### TREND ASSESSMENT

soil - down

browse - stable

herbaceous understory - stable, but poor

HERBACEOUS TRENDS --  
Herd unit 30 , Study no: 40

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	12	12	2	6	7	.11
G	Bromus tectorum (a)	-	163	-	-	62	2.52
G	Elymus junceus	9	*-	1	4	-	-
G	Hilaria jamesii	-	4	-	-	1	.03
G	Koeleria cristata	3	-	-	1	-	-
G	Oryzopsis hymenoides	5	*50	-	2	21	1.05
G	Poa fendleriana	2	*30	2	2	14	.47
G	Poa secunda	-	2	-	-	1	.00
G	Sitanion hystrix	65	*43	39	33	16	.57
G	Stipa comata	3	-	-	2	-	-
G	Stipa coronata depauperata	45	*5	13	22	2	.06
Total for Annual Grasses		0	163	0	0	62	2.52
Total for Perennial Grasses		144	146	57	72	62	2.30
Total for Grasses		144	309	57	72	124	4.83
F	Alyssum alyssoides (a)	-	1	-	-	1	.00
F	Allium spp.	-	1	-	-	1	.00
F	Antennaria parvifolia	-	-	3	-	-	-
F	Astragalus convallarius	-	-	1	-	-	-
F	Astragalus spp.	1	2	3	1	1	.03
F	Balsamorhiza hookeri	1	*23	-	1	8	.57
F	Chaenactis douglasii	5	*20	6	2	9	.09
F	Comandra pallida	9	*30	1	5	14	.24
F	Collinsia parviflora (a)	-	6	-	-	4	.02
F	Crepis acuminata	2	-	-	1	-	-
F	Dalea searlsiae	12	-	-	7	-	-
F	Eriogonum caespitosum	1	-	-	1	-	-
F	Eriogonum racemosum	-	-	2	-	-	-
F	Eriogonum cernuum (a)	-	5	-	-	3	.06
F	Erigeron spp.	-	3	-	-	2	.03
F	Eriogonum spp.	-	*7	-	-	4	.16
F	Eriogonum racemosum	8	9	-	4	5	.10
F	Eriogonum umbellatum	34	*39	9	13	19	.29
F	Gilia spp. (a)	-	6	-	-	3	.04
F	Hymenopappus filifolius	1	-	4	1	-	-
F	Ipomopsis aggregata	1	-	6	1	-	-
F	Lappula occidentalis (a)	-	12	-	-	6	.05
F	Lequerella rectipes	-	-	1	-	-	-
F	Lomatium spp.	-	4	-	-	2	.04

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
F	Lotus utahensis	8	3	4	5	1	.03
F	Lupinus argenteus	17	4	5	7	2	.06
F	Machaeranthera canescens	5	-	-	2	-	-
F	Microsteris gracilis (a)	-	80	-	-	30	.20
F	Penstemon caespitosus	45	*-	45	21	-	-
F	Penstemon spp.	8	7	-	4	4	.07
F	Petradoria pumila	55	52	17	25	20	1.41
F	Phlox austromontana	63	76	24	27	37	1.62
F	Phlox longifolia	14	*6	-	8	2	.03
F	Senecio multilobatus	9	-	5	4	-	-
F	Sphaeralcea grossulariaefolia	1	-	6	1	-	-
F	Streptanthus cordatus	-	*30	7	-	15	.64
F	Trifolium spp.	22	*12	3	13	7	.06
Total for Annual Forbs		0	110	0	0	47	0.38
Total for Perennial Forbs		322	328	152	154	153	5.52
Total for Forbs		322	438	152	154	200	5.91

\* Indicates significant difference at % = 0.10 (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 40

Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	5	.30
B	Artemisia tridentata wyomingensis	78	14.31
B	Chrysothamnus depressus	33	.44
B	Chrysothamnus viscidiflorus	29	1.47
B	Gutierrezia sarothrae	20	.17
B	Juniperus osteosperma	7	2.04
B	Pinus monophylla	18	5.69
B	Polygala subspinososa subspinososa	0	-
B	Purshia tridentata	26	3.97
Total for Browse		216	28.41

#### CANOPY COVER --

Herd unit 30 , Study no: 40

Species	Percent Cover '08
Juniperus osteosperma	1

BASIC COVER --

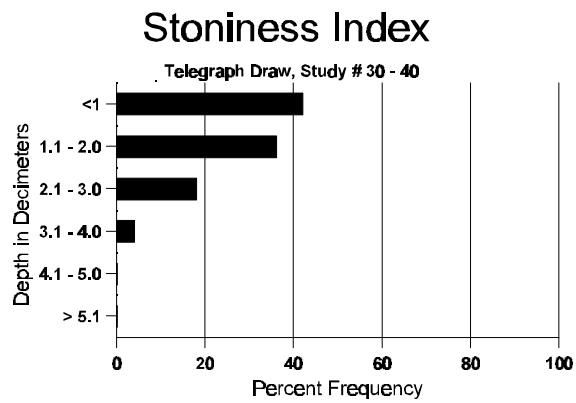
Herd unit 30 , Study no: 40

Cover Type	Nested Frequency '08	Average Cover %		
		'82	'92	'98
Vegetation	292	1.50	4.25	39.52
Rock	218	6.00	6.00	10.70
Pavement	257	7.75	22.25	13.13
Litter	379	56.50	58.00	51.14
Cryptogams	17	.25	0	.17
Bare Ground	244	27.25	9.50	20.32

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 40, Study Name: Telegraph Draw

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.9	43.6 (17.7)	5.6	46.0	17.4	36.6	2.4	3.8	310.4	.4



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 40

Type	Quadrat Frequency '98
Rabbit	8
Horse	3
Deer	9

## BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 40

Field unit 56, Study no. 40																		
A Y G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia nova																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	21	-	-	-	-	-	3	-	-	23	1	-	-	800		24	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	87	27	-	2	-	-	2	-	-	117	-	1	-	3933		118	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	124	14	-	6	-	-	2	-	-	134	2	8	2	4866	10	146	
	98	4	5	-	-	-	-	-	-	-	9	-	-	-	180	10	9	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	8	1	-	2	-	-	-	-	-	6	-	4	1	366		11	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		15%			00%			06%			-97%							
'98		42%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	0	Dec:	0%	
														'92	9165		4%	
														'98	240		0%	
Artemisia tridentata wyomingensis																		
S	82	14	-	-	-	-	-	-	-	-	14	-	-	-	466		14	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	36	-	-	17	-	-	5	-	-	57	1	-	-	1160		58	
Y	82	99	-	-	-	-	-	-	-	-	85	14	-	-	3300		99	
	92	16	2	1	3	1	-	-	-	-	23	-	-	-	766		23	
	98	36	14	-	2	-	-	1	-	-	49	4	-	-	1060		53	
M	82	72	11	3	-	-	-	-	-	-	23	63	-	-	2866	16	86	
	92	28	11	6	4	-	-	1	-	-	49	-	1	-	1666	22	50	
	98	96	41	3	14	-	-	1	-	-	155	-	-	-	3100	20	155	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	4	3	-	-	-	-	-	-	-	6	-	-	1	233		7	
	98	3	5	-	-	-	-	-	-	-	5	-	-	3	160		8	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		06%			02%			00%			-57%							
'92		21%			09%			03%			+38%							
'98		28%			01%			01%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	6166	Dec:	0%	
														'92	2665		9%	
														'98	4320		4%	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus depressus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	11	-	-	-	-	-	-	-	-	-	11	-	-	-	220	11	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	30	-	-	2	-	-	-	-	-	-	32	-	-	-	640	32	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	62	-	-	18	-	-	-	-	-	-	80	-	-	-	1600	4 6	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	2300		3%			
Chrysothamnus viscidiflorus																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	-	3	-	-	-	100	3	
	98	13	-	-	-	-	-	-	-	-	-	13	-	-	-	260	13	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	48	-	-	4	-	-	-	-	-	-	51	1	-	-	1040	11 16	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	-	1	33		1	
	98	3	-	-	-	-	-	-	-	-	-	2	-	-	1	60	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			25%			+90%							
'98		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	133		25%			
												'98	1360		4%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia sarothrae																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	29	-	-	-	-	-	-	-	-	29	-	-	-	580		29	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6	4	
	98	54	-	-	-	-	-	1	-	-	55	-	-	-	1100	6	10	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+95%							
'98		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	66		0%			
												'98	1420		1%			
Juniperus osteosperma																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	82	5	-	-	-	-	-	-	-	-	5	-	-	-	166	39	26	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33	81	54	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	-	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-40%							
'92		00%			00%			00%			+29%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	166	Dec:	-			
												'92	99		-			
												'98	140		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Pinus monophylla																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	33		1	
	98	1	-	-	1	-	-	1	-	-	3	-	-	-	60		3	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	6	-	-	2	-	-	-	-	-	8	-	-	-	266		8	
	98	11	-	-	1	-	-	-	-	-	12	-	-	-	240		12	
M	82	5	-	-	-	-	-	-	-	-	4	1	-	-	166	32	31	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33	110	74	
	98	6	-	-	1	-	-	-	-	-	7	-	-	-	140	-	-	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	-	-	1	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+50%							
'92		10%			00%			10%			+13%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	166	Dec:	0%			
												'92	332		10%			
												'98	380		0%			
Polygala subspinoso subspinoso																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	2	-	-	-	-	-	-	-	-	2	-	-	-	66	5	8	
	92	6	-	-	-	-	-	1	-	-	7	-	-	-	233	3	4	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+75%							
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	-			
												'92	266		-			
												'98	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	1	-	-	2	-	-	-	66		2	
	98	11	-	-	1	-	-	-	-	-	12	-	-	-	240		12	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	3	1	-	1	-	2	-	-	-	7	-	-	-	140		7	
M	82	2	3	1	-	-	-	-	-	-	6	-	-	-	200	26	31	6
	92	3	1	1	2	-	-	-	-	-	7	-	-	-	233	34	43	7
	98	5	11	2	1	1	1	1	-	-	22	-	-	-	440	34	49	22
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	1	-	-	-	-	-	-	2	-	-	-	66		2	
	98	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			50%			17%			00%			+40%				
		'92			10%			20%			00%			+46%				
		'98			48%			16%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	200	Dec:	0%			
												'92	332		20%			
												'98	620		6%			

Trend Study 30-41-98

Study site name: Joe Spring .

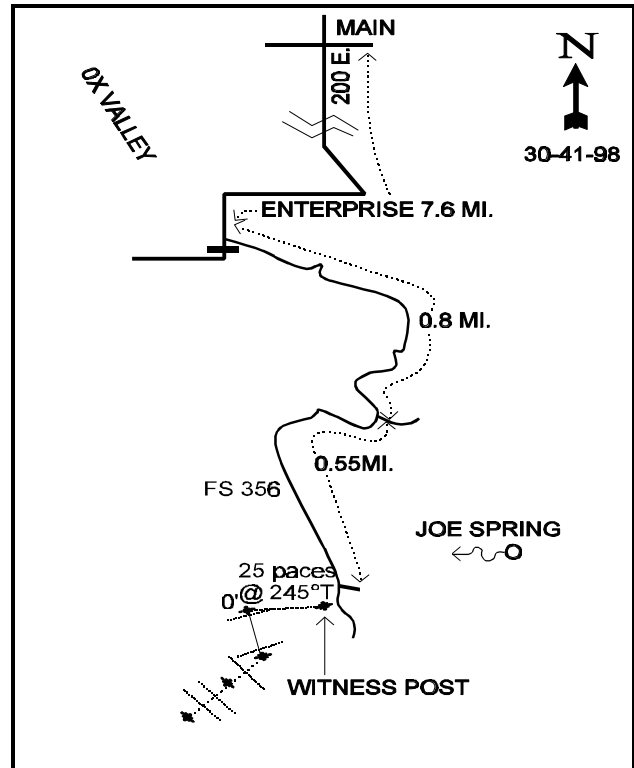
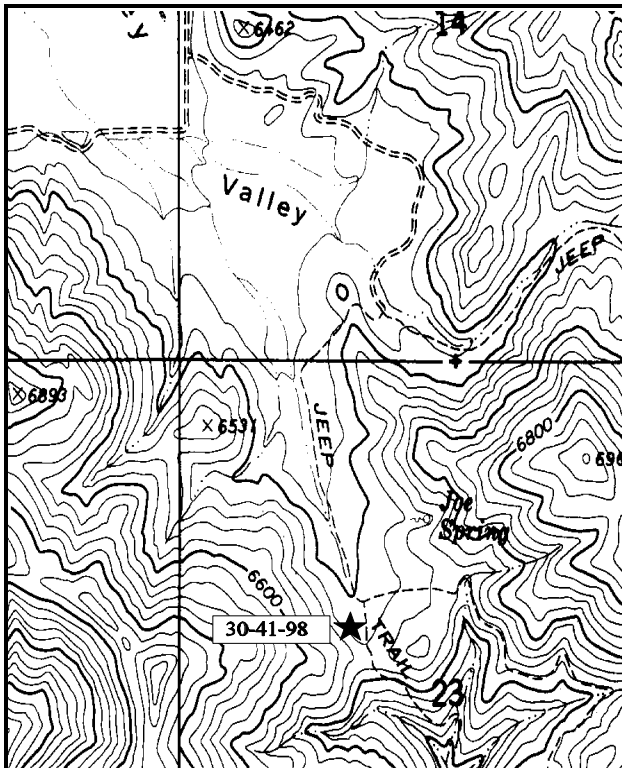
Range type: Mixed Mountain Brush .

Compass azimuth: frequency baseline 152 degrees. (Lines 2 & 3 231°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (0 & 93ft), line 2 (71ft), line 3 (34 & 59ft).

LOCATION DESCRIPTION

From 200 East and Main in Enterprise, travel southwest 7.6 miles to Ox Valley. Take a left at the ranch gate and continue east and south 0.8 miles to the next fork. Turn right on FS road 356 and travel 0.55 miles to the next fork at Joe Spring. From the intersection walk up the right fork 32 paces to a half-high marker post on the right side of the road. The 0-foot baseline is 25 paces at 245 degrees true and is marked by browse tag number 7015. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.



Map Name: Central West, Utah

Diagrammatic Sketch

Township 38S , Range 17W , Section 23

UTM 4150193.730 N, 258751.651 E

## DISCUSSION

### Trend Study No. 30-41 (50B-4c)

The Joe Spring trend study is on deer summer range near Joe Spring at the south end of Ox Valley. Elevation at the site is approximately 6,400 feet with a 15% slope and east aspect. The range type is mixed mountain brush. The entire area surrounding Ox Valley receives heavy deer and cattle use. The allotment is grazed by 621 head of cattle each year from July 15-September 30. During study site establishment in 1982, cattle were in the area and several does with fawns also observed. Pellet group data from 1998 estimate 58 deer and 10 cow days use/acre. There is a water source and salt lick within ½ mile of the site.

Soils are coarse textured and rocky, but fairly deep. Effective rooting depth (see methods) is estimated at 18 inches. Texture is a sandy loam with a moderately acid pH (5.7). Ground cover from vegetation and litter is unevenly distributed, yet is an effective barrier to soil movement. Bare ground currently ('98) accounts for 21% of the ground surface and is largely the result of livestock trailing and some deer trails which terrace the slope. These are erosive surfaces which are not currently a serious problem.

Browse composition is diverse and overall productivity is high. The principal species include: mountain big sagebrush, true mountain mahogany, Gambel oak, Utah serviceberry, mountain snowberry, and a few less desirable shrubs. Utah serviceberry showed a decreased in density between 1982 and 1992. Percent decadency also increased and the proportion of individuals heavily hedged went up (33% to 43%). Gambel oak increased in density 43% between 1982 and 1992. During the 1998 reading, the study site baseline was extended from the original 100 ft to 300 ft in order to get a better sample. The original 3 circular shrub density plots were replaced with 5, 1/100<sup>th</sup> acre density strips. This much larger sample better estimates shrub densities which are very clumped on the Joe Spring site. As a result, density of many of the shrub species changed. Utah serviceberry density increased from 466 plants/acre estimated in 1992 to 4,640 in 1998. Due to the thick nature of the serviceberry on the site, stems were counted since individual plants were hard to distinguish. Serviceberry currently ('98) accounts for 27% of the browse cover. Utilization is more moderate, vigor good, and percent decadence low at only 6%. Reproduction is poor however.

Mountain big sagebrush has increased 40% in density to 2,220 plants/acre since 1992. It displays light to moderate use, normal vigor on most plants, and low percent decadence at 13%. Reproduction is good with increasing biotic potentials and improved proportions of young plants since 1982. The true mountain mahogany is very clumped in its distribution and it appears that past samples overestimated mahogany density. Density was estimated at 1,732 plants/acre in 1982 and 1,132 in 1992. These plants displayed heavy use with reduced vigor. Density counts from 1998 estimate only 20 mature plants/acre, all of which displayed heavy use. There were no dead plants sampled, so it appears that the change in sample size is the reason for the decline in density.

Gambel oak appears to be increasing on the site with large numbers of seedlings and young counted in 1998. Utilization was reported heavy in 1992, but mostly light in 1998. Vigor was reduced in 29% of the plants, likely due to the late frosts from the spring of 1998. An increase in oak would be undesirable as it will come at the expense of other more desirable shrubs.

Grasses, although fairly diverse, are not very abundant. Nine perennial grass species were encountered in 1998, nevertheless only one, mutton bluegrass, is more than occasionally abundant. Cheatgrass brome was present in 1992 and it appeared to have increased significantly since the first reading in 1982. It was reported to dominate the understory in 1992, however annuals were not included in the previous surveys. In 1998, cheatgrass dominated the herbaceous understory. It provides 68% of the grass cover and 30% of the total herbaceous cover.

Forbs are a key vegetative element. They are fairly diverse and abundant, but probably still below optimum for this type of site. The more important forbs include lupine, arrowleaf balsamroot, and redroot eriogonum.

Overall, utilization of forbs is moderate with slightly heavier use on lupine, redroot eriogonum, and American vetch. The annual forb, littleflower collinsia, is very abundant and growing in thick patches. It currently ('98) provides 28% of the forb cover. A native perennial forb, desert phlox, is also abundant, producing 28% of the forb cover.

#### 1982 APPARENT TREND ASSESSMENT

Overall range trend is stable, even though utilization of the preferred browse species is relatively heavy. The rate of erosion is greater than it should be, yet is not currently a serious problem. Understory composition and density are fair but could be better.

#### 1992 TREND ASSESSMENT

The soil trend has improved since 1982. Basal vegetative cover has more than doubled, while bare ground has decreased 30%. The browse trend is down due to significant decreases in density and increases in percent decadency of the two preferred browse species. Utah serviceberry decreased in density by 71% while the proportion of decadent and heavily hedged plants increased. Mountain mahogany saw a decrease in its density of 35%, with a 63% increase in percent decadency. Quadrat frequency of perennial grasses remained basically unchanged. Cheatgrass brome appears to have increased, but was not included in the analysis because it is an annual. Quadrat frequency of forbs increased slightly. Trend for herbaceous understory is stable.

##### TREND ASSESSMENT

soil - up

browse - down

herbaceous understory - stable

#### 1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1992. Litter cover declined from 67% in 1982 to 64% in 1992, and 47% by 1998. It appears that the difference is due to including dried up cheatgrass as litter in 1982 and 1992, instead of classifying it as vegetation cover. Trend for the key browse species, serviceberry, and mountain big sagebrush is up slightly. Utilization of serviceberry is more moderate and percent decadence has declined from 16% to 6%. Reproduction is poor however. Sagebrush displays improved vigor, lower decadence, and good reproduction. Only one mountain mahogany plant was sampled with the larger sample. It appears that there are only a few isolated clumps on the site. They are heavily utilized, but do not occur in high enough numbers to be considered a key browse species. Gambel oak appears to be increasing. It was reportedly heavily hedged in 1992, but current use is light. A continued increase in oak will come at the expense of more desirable shrubs and herbaceous plants. Trend for the herbaceous understory is up. Sum of nested frequency of perennial grasses has remained similar, although frequency of perennial forbs has doubled.

##### TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - up overall, stable for perennial grasses but up for forbs

HERBACEOUS TRENDS --  
Herd unit 30 , Study no: 41

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron intermedium	12	*1	17	4	1	.00
G	Agropyron smithii	16	6	-	5	4	.02
G	Agropyron spicatum	56	*11	-	19	5	.19
G	Bouteloua gracilis	10	-	14	4	-	-
G	Bromus carinatus	13	22	3	8	7	.37
G	Bromus tectorum (a)	-	285	-	-	91	12.32
G	Koeleria cristata	-	-	1	-	-	-
G	Oryzopsis hymenoides	2	-	2	1	-	-
G	Poa fendleriana	3	*85	4	1	37	4.46
G	Poa pratensis	-	8	-	-	2	.18
G	Sitanion hystrix	30	15	11	13	7	.63
G	Stipa comata	9	2	5	4	1	.03
Total for Annual Grasses		0	285	0	0	91	12.32
Total for Perennial Grasses		151	150	57	59	64	5.89
Total for Grasses		151	435	57	59	155	18.22
F	Agoseris glauca	-	*34	-	-	17	.29
F	Allium spp.	-	*57	-	-	22	.48
F	Arabis spp.	-	5	-	-	2	.16
F	Artemisia ludoviciana	30	*3	15	12	1	.00
F	Aster chilensis	-	*28	-	-	14	.09
F	Astragalus spp.	2	*13	14	1	7	.11
F	Balsamorhiza sagittata	3	*33	1	2	15	2.40
F	Calochortus nuttallii	-	8	-	-	6	.03
F	Comandra pallida	17	18	15	7	8	.16
F	Collinsia parviflora (a)	-	283	-	-	85	6.48
F	Crepis acuminata	-	*11	-	-	9	.27
F	Cymopterus spp.	-	*36	-	-	19	.32
F	Erigeron eatonii	11	15	4	6	7	.35
F	Erigeron spp.	-	*17	-	-	9	.17
F	Eriogonum racemosum	2	6	5	1	3	.21
F	Galium boreale	-	7	-	-	3	.01
F	Hackelia patens	-	*22	-	-	12	.30
F	Linum lewisii	-	2	-	-	1	.15
F	Lomatium spp.	-	1	-	-	1	.03
F	Lupinus argenteus	84	*30	36	43	16	1.29
F	Machaeranthera canescens	18	*3	13	7	1	.00
F	Microsteris gracilis (a)	-	25	-	-	12	.16
F	Penstemon spp.	-	4	-	-	2	.04

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'92	'98	'82	'92	'98	
F	Phlox austromontana	85	*124	11	33	46	6.40
F	Phacelia heterophylla	1	6	2	1	2	.79
F	Sphaeralcea grossulariaefolia	-	1	1	-	1	.03
F	Stephanomeria tenuifolia	-	*11	-	-	5	.12
F	Unknown forb-annual (a)	-	4	-	-	3	.09
F	Unknown forb-perennial	-	5	-	-	2	.03
F	Vicia americana	54	*101	12	28	41	2.21
Total for Annual Forbs		0	312	0	0	100	6.73
Total for Perennial Forbs		307	601	129	141	272	16.52
Total for Forbs		307	913	129	141	372	23.25

\* Indicates significant difference at % = 0.10 (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 41

Type	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	26	8.55
B	Artemisia tridentata vaseyana	61	10.19
B	Cercocarpus ledifolius	1	-
B	Cercocarpus montanus	1	-
B	Chrysothamnus depressus	3	.03
B	Chrysothamnus viscidiflorus	26	1.43
B	Eriogonum microthecum	0	-
B	Opuntia spp.	1	.03
B	Quercus gambelii	34	10.28
B	Quercus turbinella	0	-
B	Ribes spp.	1	.38
B	Symphoricarpos oreophilus	3	.33
B	Tetradymia canescens	0	.03
Total for Browse		157	31.28

#### CANOPY COVER --

Herd unit 30 , Study no: 41

Species	Percent Cover '98
Quercus gambelii	11

BASIC COVER --

Herd unit 30 , Study no: 41

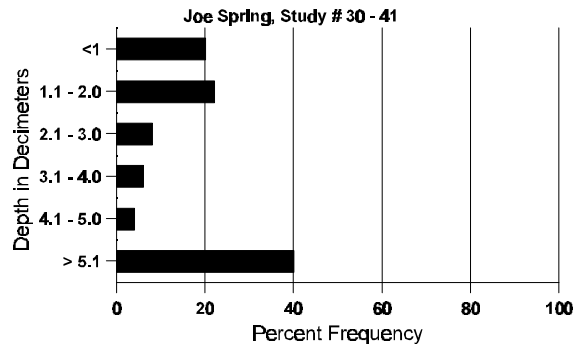
Cover Type	Nested Frequency 08	Average Cover %		
		'82	'92	'98
Vegetation	366	2.75	3.00	59.19
Rock	132	1.25	3.00	7.60
Pavement	173	.50	26.00	4.94
Litter	378	67.25	49.00	46.79
Cryptogams	-	0	0	0
Bare Ground	244	28.25	21.00	20.56

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 41, Study Name: Joe Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.0	41.8 (16.7)	5.7	68.0	17.4	14.6	1.8	15.0	150.4	.4

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 41

Type	Quadrat Frequency 08
Rabbit	3
Deer	29
Cattle	2

## BROWSE CHARACTERISTICS --

Herd unit 30, Study no: 41

Field unit 56, Study no. 41																			
A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Amelanchier utahensis																			
S	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	82	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3	
	92	-	-	-	2	-	-	1	-	-	3	-	-	-	200			3	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3	
M	82	12	-	8	-	-	-	-	-	-	18	2	-	-	1333	46	11	20	
	92	1	-	2	-	-	-	-	-	-	3	-	-	-	200	20	36	3	
	98	74	48	27	-	66	-	-	-	-	210	5	-	-	4300	45	33	215	
D	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1	
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1	
	98	6	2	4	-	2	-	-	-	-	11	3	-	-	280			14	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'82		00%				33%				00%				-71%					
'92		00%				43%				00%				+90%					
'98		51%				13%				00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	1599	Dec:	4%				
												'92	466		14%				
												'98	4640		6%				
Artemisia tridentata vaseyana																			
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1	
	98	25	-	-	-	-	-	-	-	-	25	-	-	-	500			25	
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2	
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4	
	98	18	5	-	-	-	-	-	-	-	23	-	-	-	460			23	
M	82	14	1	-	-	-	-	-	-	-	15	-	-	-	1000	24	32	15	
	92	9	1	1	1	-	-	-	-	-	11	1	-	-	800	22	27	12	
	98	48	15	5	2	4	-	-	-	-	74	-	-	-	1480	22	33	74	
D	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2	
	92	1	2	-	1	-	-	-	-	-	1	-	2	1	266			4	
	98	6	8	-	-	-	-	-	-	-	10	1	-	3	280			14	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'82		05%				00%				00%				+ 5%					
'92		15%				05%				15%				+40%					
'98		29%				05%				03%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	1266	Dec:	11%				
												'92	1332		20%				
												'98	2220		13%				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cercocarpus ledifolius																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%			-39%				
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	66		-			
												'98	40		-			
Cercocarpus montanus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	3	-	-	-	-	3	-	-	-	200		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	-	-	16	-	-	-	-	-	-	16	-	-	-	1066		16	
	92	-	-	-	2	6	-	-	-	-	8	-	-	-	533		8	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	-	6	-	-	-	-	-	-	4	2	-	-	400	8 6	6	
	92	-	-	1	-	-	1	-	-	-	2	-	-	-	133	6 7	2	
	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20	14 20	1	
D	82	-	-	4	-	-	-	-	-	-	-	-	4	-	266		4	
	92	-	-	7	-	-	-	-	-	-	4	-	-	3	466		7	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			100%			15%			-35%				
		'92			35%			53%			18%			-98%				
		'98			00%			100%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	1732	Dec:	15%			
												'92	1132		41%			
												'98	20		0%			
Chrysothamnus depressus																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	2	1	-	1	-	-	-	-	-	4	-	-	-	80	8 15	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'92			00%			00%			00%							
		'98			25%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	80		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus viscidiflorus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	82	16	-	-	-	-	-	-	-	-	16	-	-	-	1066	15	29	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	34	-	2	2	-	-	1	-	-	39	-	-	-	780	14	24	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			04%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1066	Dec:	0%			
												'92	0		0%			
												'98	960		4%			
Eriogonum microthecum																		
M	82	4	-	-	-	-	-	-	-	-	-	4	-	-	266	5	15	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	9	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-75%							
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	266	Dec:	-			
												'92	66		-			
												'98	0		-			
Opuntia spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	10	-	-	10	2	-	-	800		12	
	98	5	-	-	12	-	-	-	-	-	17	-	-	-	340		17	
Y	82	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	92	-	-	7	-	-	-	4	-	-	4	7	-	-	733		11	
	98	55	-	-	4	-	-	-	-	-	30	2	27	-	1180		59	
M	82	4	2	5	-	-	-	-	-	-	11	-	-	-	733	47	23	
	92	-	2	5	-	-	-	-	-	-	2	5	-	-	466	71	47	
	98	154	13	-	1	-	-	-	-	-	131	-	37	-	3360	35	31	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	10	-	-	-	-	-	-	1	9	-	-	666		10	
	98	15	2	-	-	-	-	-	2	-	11	-	-	8	380		19	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		13%			31%			00%			+43%							
'92		07%			79%			00%			+62%							
'98		06%			00%			29%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	1066	Dec:	0%			
												'92	1865		36%			
												'98	4920		8%			
Quercus turbinella																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	35	20	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	0		-			
Ribes spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	57	58	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	2	-	-	5	-	-	-	333		5	
	98	5	-	-	10	-	-	-	-	-	15	-	-	-	300		15	
M	82	10	-	-	-	-	-	-	-	-	10	-	-	-	666	25 22	10	
	92	1	2	-	-	-	-	-	-	-	3	-	-	-	200	19 29	3	
	98	4	4	-	5	-	-	-	-	-	13	-	-	-	260	12 17	13	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-10%							
'92		22%			00%			00%			- 7%							
'98		14%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	666	Dec:	0%			
												'92	599		11%			
												'98	560		0%			
Tetradymia canescens																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12 15	1	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	66	11 14	1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+67%							
'92		33%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	-			
												'92	199		-			
												'98	0		-			

Trend Study 30-42-98

Study site name: Grapevine Spring .

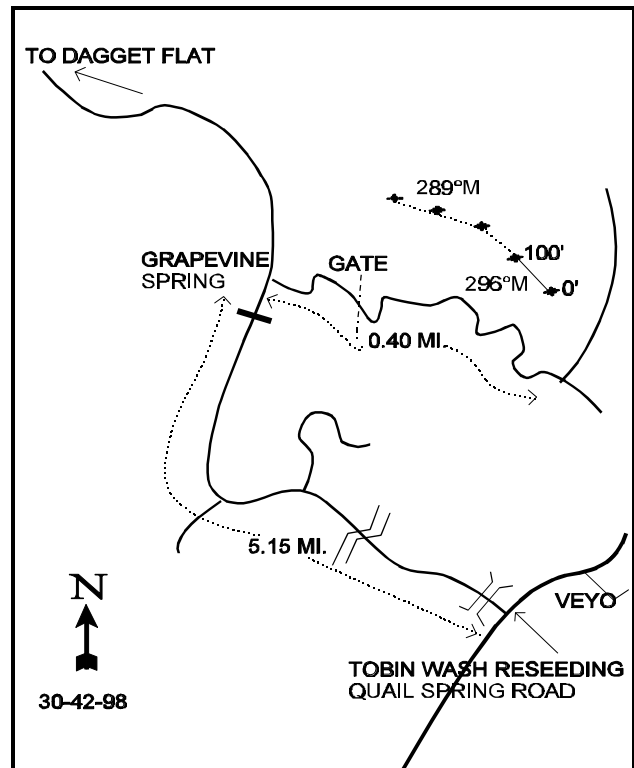
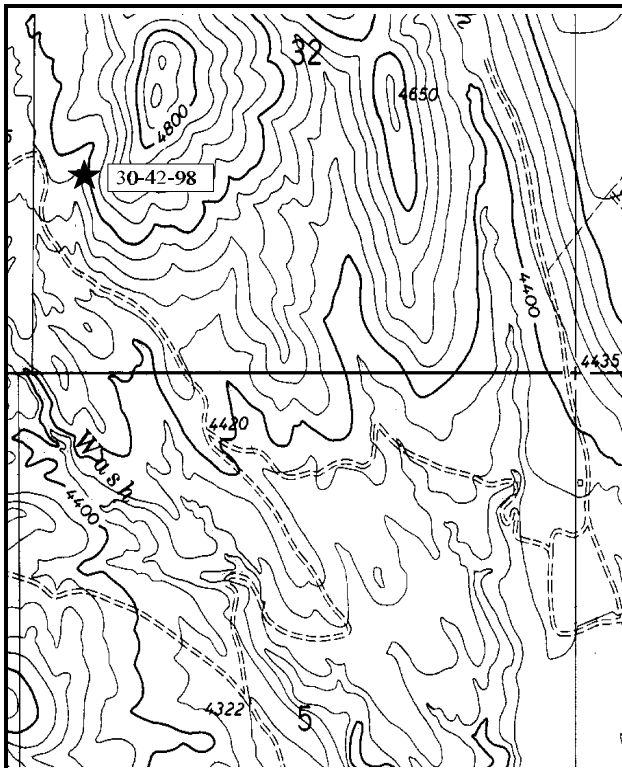
Range type: Sagebrush-Reseeded .

Compass azimuth: frequency baseline 296 M degrees. (Lines 3 & 4 289°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (10 & 92ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Veyo, proceed west on Gunlock Road 5.6 miles until you come to a sign saying Tobin Wash and with Eagle Mountain Ranch just off the road. Take the Goldstrike Road for 5.15 miles until you come to Grapevine Spring. Just past Grapevine Spring, take the fork to the right. Travel 0.40 miles till you come to another fork in the road to the left and stop. From the fork in the road, the 0-foot baseline stake is 10 paces away at a bearing of 281 degrees true. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height. The baseline is marked with browse tag #7098.



Map Name: Gunlock, Utah

Diagrammatic Sketch

Township 39S , Range 17W , Section 32

UTM 4137237.097 N, 252747.291 E

## DISCUSSION

### Trend Study No. 30-42 (50B-5c)

The Grapevine Spring trend study is within the critical deer winter range, one-half mile east of Grapevine Spring. The study is an old pinyon-Juniper chained area that currently supports a mixed browse stand. Elevation is 4,000 feet (the lowest of any site in the management unit) on a gentle 5% slope and a south to southeast aspect. Pellet group data from 1998 show a moderate level of deer use at 32 days use/acre. There was also a few cattle pats encountered (2 cow days use/acre).

Soils are shallow, moderately rocky, and generally lack effective cover. Effective rooting depth (see methods) was estimated at 14 inches in 1998. Soil texture is a sandy clay loam with a neutral pH (6.7). Phosphorus may be limiting to plant growth at 8.5 ppm, when 10 ppm is considered the minimum value for normal plant development. There is a considerable amount of pavement concentrated on the ground surface in the shrub interspaces. Litter consists largely of dead cheatgrass. Erosion is moderate, yet it is less severe than on untreated pinyon-juniper woodlands in the immediate area. The gentle, almost flat terrain helps prevent serious soil loss.

The key browse species is mountain big sagebrush with lesser amounts of desert ceanothus and Stansbury cliffrose. The population of big sagebrush has increased from 566 plants/acre in 1982 to 2,432 in 1992 and 4,380 by 1998. Seedling and young plants are numerous and vigor is good. Desert ceanothus increased 53% in density between 1982 and 1992, but estimates from 1998 are similar to 1982 levels. Stansbury cliffrose occurs in similar densities. Both species have good age structures and vigor. Utilization is currently ('98) light to moderate with heavier use reported in 1982 and 1992 for desert ceanothus. Other preferred browse species found on the site include a few scattered green ephedra.

The most abundant browse species in 1992 was the increaser broom snakeweed which had expanded from 8,799 plants/acre in 1982 to 11,933 by 1992. Seedlings and young were numerous, indicating an expanding population at that time. During the 1998 reading, population density actually declined 74% to 3,080 plants/acre. The majority of the change in density was due to the much larger sample used in 1998, but it is apparent from the number of dead plants counted that the population had really declined. Actually the number of dead plants in the population only accounts for about 6% of the decrease. Therefore, the change in density is mostly associated with the larger sampling design giving more accurate estimates for shrubs with discontinuous and/or clumped distributions. Currently, there are still high numbers of seedlings and young. Surviving pinyon and juniper trees are increasing in size on the site. Point quarter data from 1998 estimate 47 pinyon and 54 juniper trees/acre. Average basal diameter is 2.6 inches for pinyon and 3.1 inches for juniper. Overhead canopy cover is estimated at only 3%.

Grass composition consists of both native and seeded species which are not very vigorous and produce little available forage. The principal species, intermediate wheatgrass and bottlebrush squirreltail, had all sustained approximately 30% utilization during the 1982 reading. The annual grasses, cheatgrass brome and foxtail brome, provide 76% of the grass cover. Perennial forbs are sparse with relatively few species found more than occasionally. The most abundant species in 1998 was Searls prairie clover which provided 65% of the forb cover. Forb utilization is generally light.

### 1982 APPARENT TREND ASSESSMENT

Soil condition is poor, but not noticeably declining. There is a lot of bare ground and pavement, yet erosion has been limited somewhat by the gentle slope. Vegetation trend is stable to improving, if one uses the key species as the principal criteria. Mountain big sagebrush is expanding, but so also is broom snakeweed. Other browse species are relatively static. Perennial herbaceous cover is poor, but could be improved with time and grazing management.

## 1992 TREND ASSESSMENT

Basal vegetative cover increased from 1% to 3% since the last reading, while bare ground increased by 14%. Litter cover has declined from 60% to 49%. Protective ground cover has declined slightly from 82% to 79%. Trend for soil is stable to slightly declining. The browse trend is up due to significant increases in the density and reproductive potentials of key shrub species. However, broom snakeweed is abundant and has also increased. Trend for the herbaceous understory is down with large decreases in quadrat frequencies of both grasses and forbs.

### TREND ASSESSMENT

soil - stable to slightly declining

browse - up

herbaceous understory - down

## 1998 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground from 21% to 29% and a slight decline in litter cover. Erosion is still not a serious problem due to the gentle terrain. Trend for browse is up slightly. Mountain big sagebrush appears to be increasing with light to moderate use, good vigor and low decadence. It currently contributes 60% of the browse cover. Desert ceanothus and cliffrose have lower densities compared to 1992, but most of the difference is due to the larger sample used in 1998. Desert ceanothus displays less heavy use. Both desert ceanothus and cliffrose appear to have stable populations. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses increased slightly while nested frequency of perennial forbs increased 11 fold. Several new forb species were encountered in the larger sample.

### TREND ASSESSMENT

soil - down slightly

browse - up slightly

herbaceous understory - up slightly, but poor

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 42

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	1	5	16	1	2	.15
G	Agropyron intermedium	40	*3	38	16	2	.01
G	Agropyron trachycaulum	-	7	1	-	2	.06
G	Bromus rubens (a)	-	11	-	-	5	.37
G	Bromus tectorum (a)	-	121	-	-	46	1.02
G	Oryzopsis hymenoides	3	-	2	1	-	-
G	Sitanion hystrix	67	*50	20	34	27	.96
G	Vulpia octoflora (a)	-	12	-	-	5	.02
Total for Annual Grasses		0	144	0	0	56	1.42
Total for Perennial Grasses		111	65	77	52	33	1.19
Total for Grasses		111	209	77	52	89	2.62

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
F	<i>Arabis holboellii</i>	-	-	3	-	-	-
F	<i>Castilleja linariaefolia</i>	-	2	-	-	1	.00
F	<i>Calochortus nuttallii</i>	-	*15	-	-	7	.04
F	<i>Comandra pallida</i>	4	-	1	2	-	-
F	<i>Cirsium</i> spp.	-	1	-	-	1	.00
F	<i>Cordylanthus parviflorus</i>	11	-	3	4	-	-
F	<i>Dalea searlsiae</i>	-	*33	-	-	16	3.84
F	<i>Draba</i> spp. (a)	-	66	-	-	28	.48
F	<i>Eriogonum</i> spp.	3	-	-	1	-	-
F	<i>Euphorbia</i> spp.	-	*28	-	-	12	.28
F	<i>Frasera albomarginata</i>	-	*13	5	-	5	.25
F	<i>Lomatium</i> spp.	-	1	-	-	1	.00
F	<i>Lotus plebeius</i>	32	*34	21	15	18	.57
F	<i>Medicago sativa</i>	-	-	2	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	3	-	-	1	.00
F	<i>Penstemon</i> spp.	-	6	12	-	2	.06
F	<i>Phlox hoodii</i>	6	9	-	5	4	.33
F	<i>Sphaeralcea grossulariaefolia</i>	1	-	-	1	-	-
F	Unknown forb-perennial	9	3	-	6	1	.00
F	<i>Viguiera multiflora</i>	-	5	-	-	3	.04
Total for Annual Forbs		11	69	0	4	29	0.49
Total for Perennial Forbs		55	150	47	30	71	5.45
Total for Forbs		66	219	47	34	100	5.94

\* Indicates significant difference at  $\alpha = 0.10$  (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 42

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata vaseyana</i>	82	20.35
B	<i>Ceanothus greggii</i>	9	-
B	<i>Chrysothamnus viscidiflorus</i> <i>viscidiflorus</i>	0	-
B	<i>Cowania mexicana</i> <i>stansburiana</i>	12	3.59
B	<i>Ephedra viridis</i>	0	.15
B	<i>Eriodictyon angustifolium</i>	6	-
B	<i>Garrya flavescens</i>	2	1.00
B	<i>Gutierrezia sarothrae</i>	45	2.53
B	<i>Juniperus osteosperma</i>	3	1.75
B	<i>Opuntia</i> spp.	0	-
B	<i>Pinus monophylla</i>	1	.53
B	<i>Quercus turbinella</i>	9	3.96
Total for Browse		169	33.90

## CANOPY COVER --

Herd unit 30 , Study no: 42

Species	Percent Cover '98
<i>Juniperus osteosperma</i>	2
<i>Pinus monophylla</i>	1

## BASIC COVER --

Herd unit 30 , Study no: 42

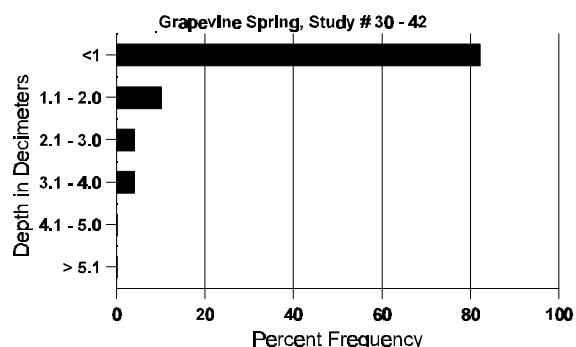
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	241	1.00	3.00	39.41
Rock	239	1.50	3.00	7.40
Pavement	308	19.75	26.00	22.61
Litter	381	60.00	49.00	45.50
Cryptogams	14	0	0	.05
Bare Ground	283	17.75	21.00	28.76

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 42, Study Name: Grapevine Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.3	55.2 (14.2)	6.7	48.0	25.4	26.6	1.8	8.5	108.8	.6

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 42

Type	Quadrat Frequency '98
Rabbit	17
Deer	22
Cattle	1

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 42

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4	5	6	7	8	9		1	2		3	4	
Artemisia tridentata vaseyana																	
S	82	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6
	98	84	-	-	3	-	-	-	-	-	87	-	-	-	1740		87
Y	82	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8
	92	15	7	-	-	-	-	1	-	-	23	-	-	-	766		23
	98	30	-	-	7	-	-	1	-	-	38	-	-	-	760		38
M	82	9	-	-	-	-	-	-	-	-	9	-	-	-	300	15 20	9
	92	31	13	1	2	-	-	1	-	-	48	-	-	-	1600	26 32	48
	98	114	59	-	2	-	-	1	-	-	176	-	-	-	3520	22 33	176
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2
	98	5	-	-	-	-	-	-	-	-	1	-	1	3	100		5
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
		'82 00%			00%			00%			+77%						
		'92 27%			01%			00%			+44%						
		'98 27%			00%			02%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	566	Dec:	0%		
												'92	2432		3%		
												'98	4380		2%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ceanothus greggii																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	9	-	-	-	-	-	-	-	-	9	-	-	-	300		9	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	82	6	-	1	-	-	-	-	-	-	7	-	-	-	233	31 29	7	
	92	3	2	-	-	-	3	1	-	-	9	-	-	-	300	26 40	9	
	98	7	2	-	-	-	-	-	-	-	9	-	-	-	180	27 42	9	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	98	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			14%			00%			+53%							
'92		13%			27%			00%			-52%							
'98		17%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	233	Dec:	0%	
														'92	499		7%	
														'98	240		17%	
Chrysothamnus viscidiflorus viscidiflorus																		
M	82	16	-	-	-	-	-	-	-	-	16	-	-	-	533	11 16	16	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	533	Dec:	-	
														'92	0		-	
														'98	0		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cowania mexicana stansburiana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	-	-	-	-	66		2	
	98	2	-	-	1	-	-	-	-	-	-	-	-	-	60		3	
Y	82	1	-	-	-	-	-	-	-	-	-	-	-	-	33		1	
	92	6	4	-	-	-	-	-	-	-	-	-	-	-	333		10	
	98	3	1	-	-	-	-	-	-	-	-	-	-	-	80		4	
M	82	2	-	-	-	-	-	-	-	-	-	-	-	-	66	31	44	
	92	3	2	-	-	-	-	-	-	-	-	-	-	-	166	61	66	
	98	5	3	-	-	1	-	-	-	-	-	-	-	-	180	58	71	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	-	-	-	-	-	-	-	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+81%							
'92		38%			06%			00%			-51%							
'98		38%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	99	Dec:	0%			
												'92	532		6%			
												'98	260		0%			
Ephedra viridis																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	29	42	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	0		-			
Eriodictyon angustifolium																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	2	-	-	-	-	-	-	-	-	-	-	-	-	66	20	22	
	98	26	-	-	-	-	-	-	-	-	-	-	-	-	520	24	16	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	-	-	-	-	-	-	-	-	-	1	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+90%							
'98		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	66		0%			
												'98	640		16%			
Garrya flavescens																		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33	24	30	1
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33	20	24	1
	98	1	-	-	-	-	1	-	-	-	1	1	-	-	40	22	31	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			00%			00%			+18%							
'98		00%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	33	Dec:	-			
												'92	33		-			
												'98	40		-			
Gutierrezia sarothrae																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	54	-	-	16	-	-	-	-	-	70	-	-	-	2333			70
	98	44	-	-	-	-	-	-	-	-	44	-	-	-	880			44
Y	82	16	-	-	-	-	-	-	-	-	16	-	-	-	533			16
	92	24	-	-	3	-	-	-	-	-	27	-	-	-	900			27
	98	27	-	-	2	-	-	-	-	-	29	-	-	-	580			29
M	82	248	-	-	-	-	-	-	-	-	248	-	-	-	8266	12	12	248
	92	293	1	-	5	-	-	1	-	-	300	-	-	-	10000	10	12	300
	98	106	-	2	2	-	-	-	-	-	110	-	-	-	2200	8	10	110
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	28	-	-	2	-	-	1	-	-	29	-	2	-	1033			31
	98	15	-	-	-	-	-	-	-	-	4	-	-	11	300			15
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	500			25
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+26%							
'92		.27%			00%			.55%			-74%							
'98		00%			01%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	8799	Dec:	0%			
												'92	11933		9%			
												'98	3080		10%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	3	-	-	-	-	-	-	-	-	3	-	-	-	100	53	43	
	92	2	2	-	-	-	-	-	-	-	2	2	-	-	133	73	58	
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+33%							
'92		33%			00%			00%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	-			
												'92	199		-			
												'98	60		-			
Opuntia spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	13	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	0		-			
Pinus monophylla																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			-39%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	33		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.			Total
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Quercus turbinella																			
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8	
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33	44	59	1	
	92	-	2	-	-	-	-	-	-	-	2	-	-	-	66	51	49	2	
	98	22	-	-	-	-	-	-	-	-	22	-	-	-	440	55	68	22	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>								
'82		00%			00%			00%			+50%								
'92		100%			00%			00%			+86%								
'98		00%			00%			00%											
Total Plants/Acre (excluding Dead & Seedlings)												'82	33	Dec:	-				
												'92	66		-				
												'98	460		-				

### Trend Study 30-45-98

Study site name: Flat Top Mountain .

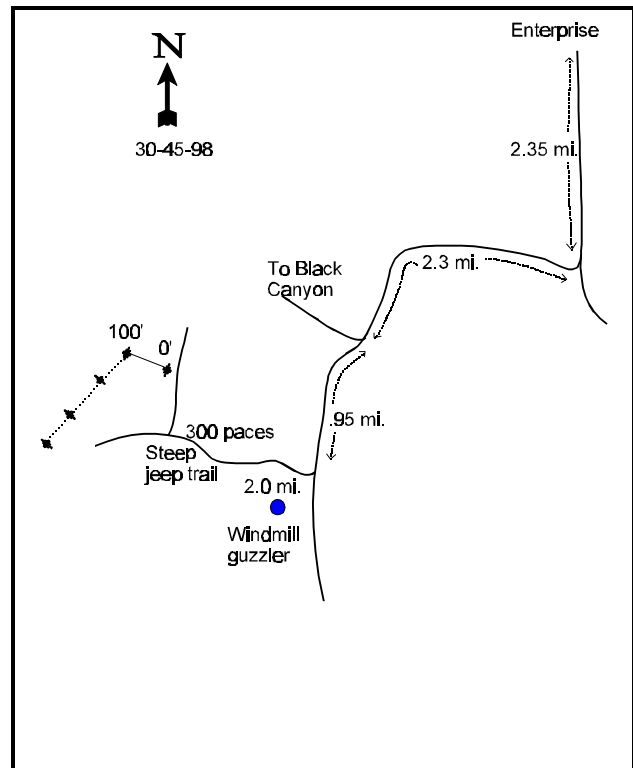
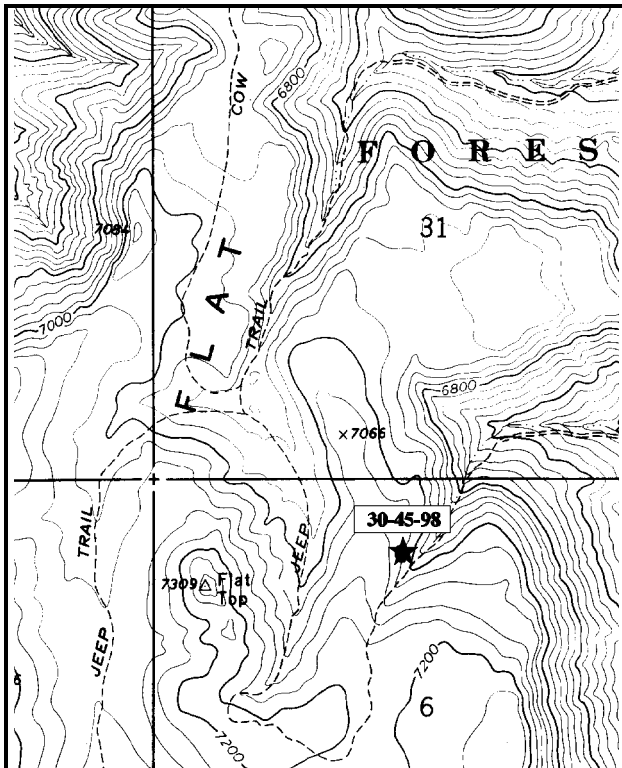
Range type: Oakbrush .

Compass azimuth: frequency baseline 285 M degrees. (Lines 2-4 220°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (0 & 92ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

### LOCATION DESCRIPTION

From the town of Enterprise, go south on 200 East for 2.35 miles, at which point there will be a fork in the road. Take a right and head towards Calf Springs. Stay on the main road for 2.3 miles until arriving at another fork in the road marked by a sign “Black Canyon.” Do not proceed towards Black Canyon. Take the left fork for 0.95 miles until arriving at another fork in the road. Take the right fork for 2.0 miles until the road turns into a steep jeep trail. Approximately 300 paces up the road from where it first becomes steep and rough will be an intersection. Walk 10 paces down the road to the left (west). The 0-foot baseline stake is located 11 paces north of the road. The study is marked by green steel “T” fence posts approximately 12 to 18 inches in height.



Map Name: Hebron, Utah

Diagrammatic Sketch

Township 38 S , Range 17 W , Section 6 .

UTM 4155401.696 N, 252530.887 E

## DISCUSSION

### Trend Study No. 30-45 (50B-8c)

The Flat Top Mountain trend study is within deer summer range on the east side of Flat Top Mountain. The range type is dense oakbrush which varies in stature from 12 to 15 feet in some areas and waist high in others. The site has a northeast aspect and an elevation of about 6,400 feet. Slope varies from 25% at the bottom of the hill to 5% on the more level ridge top. Deer appeared to be utilizing the area in 1982 as pellet groups and bedding areas were abundant. Pellet group data taken on the site in 1998 estimate a moderate amount of deer use at 40 days use/acre.

Soil is derived from basalt parent material which is common on the soil surface, especially on the ridge top. Surface rock provided 10% cover in 1982, but the extended baseline used in 1998 estimated 22% rock cover. Soil depth is moderately deep with an estimated effective rooting depth (see methods) of 16 inches. Texture is a loam with a moderately acid pH (5.6). Soil temperature is very low averaging only 37° F at a depth of 16 inches. This low temperature is obviously effected by the high rock content of the soil combined with high moisture content. The site was read on May 27, 1998 and snow fell on much of this area on May 13<sup>th</sup>. Soil organic matter is high at 5.2%, which is the highest recorded on the unit. Soil erosion is not a problem on the site, however roads in the area are severely gullied.

The key browse species on the site is Gambel oak. It currently provides 65% of the browse cover with a total cover value of 12%. Oak varies in size from tall tree-like forms 12 to 15 feet in height, to lower growing forms that are only waist high. Density was estimated at 7,599 stems/acre in 1982. The oak was mostly light to moderately utilized, in good vigor, with no decadent plants sampled. The larger sample taken in 1998 estimated 6,760 stems/acre. Utilization is similar to 1982 levels, vigor is normal, and percent decadency low at 2%. Reproduction is good with 20% of the population consisting of young plants.

Understory shrubs include: Utah serviceberry, mountain big sagebrush, and snowberry. Serviceberry had a density of 800 plants/acre ('98). Mature plants average about 4 feet in height. They mostly have moderately hedged individuals, but they are in good vigor. Sagebrush is heavily utilized with a density of 780 plants/acre. Snowberry appears to be unutilized. There is also a few bitterbrush on the site that were not abundant enough to be adequately sampled. All plants were heavily hedged to the point of being mostly unavailable.

The herbaceous understory is dominated by forbs which currently provide 83% of the herbaceous cover. Grasses are represented by only one species, mutton bluegrass. Forbs are diverse and abundant with the primary species consisting of: arrowleaf balsamroot, western waterleaf, tuber starwort, and American vetch.

### 1982 APPARENT TREND ASSESSMENT

Range trend is stable on this site. Soil movement is minimal and there are few areas not covered by litter or vegetation. Vegetatively, the area appears static, although there may be a trend toward taller, more mature oak trees and increasing shade. This may prove detrimental in the long run to some of the secondary browse species and some forbs.

### 1998 TREND ASSESSMENT

Trend for soil is stable with little bare ground exposed. Litter cover declined from 81% to 59%, likely due to the larger sample used in 1998 sampling out of oak clones. Trend for browse appears stable with some of the changes in density due to the much larger sample. Utilization is heavier on understory shrubs, but similar on oak. Reproduction of the key species appears adequate to maintain their populations. Trend for the herbaceous understory is up slightly. Quadrat frequency of mutton bluegrass increased from 2% to 41%. Quadrat frequency of perennial forbs also increased.

# TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - up slightly

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 45

Type	Species	Nested Frequency '08	Quadrat Frequency		Average Cover % '08
			'82	'98	
G	Poa fendleriana	110	2	41	5.82
	Total for Annual Grasses	0	0	0	0
	Total for Perennial Grasses	110	2	41	5.82
	Total for Grasses	110	2	41	5.82
F	Achillea millefolium	-	3	-	-
F	Agoseris glauca	1	-	1	.00
F	Allium spp.	44	-	19	.46
F	Arabis spp.	1	-	1	.00
F	Artemisia ludoviciana	-	14	-	-
F	Aster spp.	49	-	16	1.05
F	Balsamorhiza sagittata	108	28	44	11.13
F	Calochortus nuttallii	1	-	1	.03
F	Collinsia parviflora (a)	1	-	1	.00
F	Crepis acuminata	1	-	1	.00
F	Cymopterus spp.	9	-	4	.22
F	Hydrophyllum occidentale	99	-	46	6.28
F	Helianthella uniflora	-	7	-	-
F	Lathyrus lanszwertii	-	15	-	-
F	Lithospermum ruderales	-	2	-	-
F	Lupinus argenteus	4	2	2	.15
F	Microsteris gracilis (a)	34	-	16	.15
F	Petradorea pumila	8	-	4	.21
F	Phlox austromontana	10	-	4	.45
F	Phlox longifolia	-	1	-	-
F	Senecio multilobatus	9	-	4	.24
F	Solidago sparsiflora	-	27	-	-
F	Stellaria jamesiana	191	47	68	6.17
F	Taraxacum officinale	3	-	1	.03
F	Vicia americana	77	36	34	1.09
F	Zigadenus paniculatus	6	-	2	.03
	Total for Annual Forbs	35	0	17	0.15

T y p e	Species	Nested Frequency '98	Quadrat Frequency		Average Cover % '98
			'82	'98	
	Total for Perennial Forbs	621	182	252	27.60
	Total for Forbs	656	182	269	27.76

#### BROWSE TRENDS --

Herd unit 30 , Study no: 45

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	9	.19
B	Artemisia tridentata vaseyana	16	2.12
B	Chrysothamnus depressus	2	-
B	Chrysothamnus viscidiflorus	1	.03
B	Opuntia spp.	3	-
B	Prunus virginiana	0	-
B	Purshia tridentata	0	-
B	Quercus gambelii	67	11.91
B	Symphoricarpos oreophilus	14	4.13
	Total for Browse	112	18.40

#### CANOPY COVER --

Herd unit 30 , Study no: 45

Species	Percent Cover '98
Quercus gambelii	9

#### BASIC COVER --

Herd unit 30 , Study no: 45

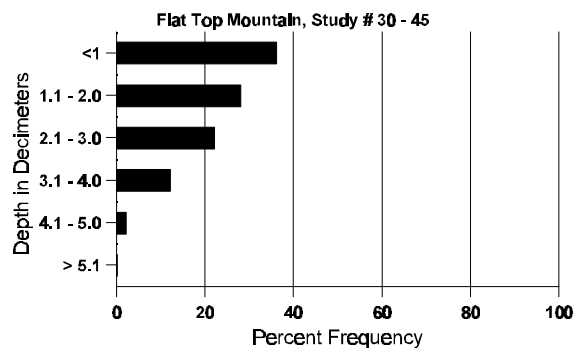
Cover Type	Nested Frequency '98	Average Cover %	
		'82	'98
Vegetation	322	2.50	46.23
Rock	207	10.00	21.60
Pavement	94	0	2.88
Litter	378	80.50	58.93
Bare Ground	111	6.25	5.19

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 45, Study Name: Flat Top Mountain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.3	37.0 (15.9)	5.6	38.0	37.4	24.5	5.2	52.1	435.2	.6

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 45

Type	Quadrat Frequency '98
Deer	17

BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 45

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.		Total			
		1	2	3	4	5	6	7	8	9		1	2		3	4	
Amelanchier utahensis																	
S	82	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	4	-	-	-	-	-	9	-	-	-	180		9
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	12	-	2	-	-	-	-	-	14	-	-	-	280		14
M	82	3	-	-	-	-	-	-	-	-	2	1	-	-	200	10 10	3
	98	-	6	-	-	10	-	-	10	-	26	-	-	-	520	46 31	26
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'82		00%				00%				00%				+75%			
'98		70%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	200	Dec:	-		
												'98	800		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	15	16	
	98	1	14	17	-	-	4	-	-	1	37	-	-	-	740	13	27	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	1	-	-	-	-	-	-	-	-	-	1	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+92%							
'98		36%			59%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	0%			
												'98	780		3%			
Chrysothamnus depressus																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
M	82	-	2	-	-	-	-	-	-	-	2	-	-	-	133	7	16	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		100%			00%			00%			+70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	-			
												'98	440		-			
Chrysothamnus viscidiflorus																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	20		-			
Opuntia spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	4	-	-	-	-	-	-	-	-	1	-	3	-	80	8	17	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'98		00%			00%			75%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	80		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Prunus virginiana																		
M	82	16	-	-	-	-	-	-	-	-	16	-	-	-	1066	10	5	16
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82	00%			00%			00%									
		'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	1066	Dec:	-			
												'98	0		-			
Purshia tridentata																		
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82	00%			00%			00%									
		'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	0		-			
Quercus gambelii																		
S	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	82	13	-	-	-	-	-	4	-	-	17	-	-	-	1133			17
	98	45	-	-	21	-	-	-	-	-	66	-	-	-	1320			66
M	82	56	34	5	-	-	-	2	-	-	75	22	-	-	6466	19	20	97
	98	109	70	-	66	-	-	-	21	-	266	-	-	-	5320	44	30	266
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	5	1	-	-	-	-	-	-	-	6	-	-	-	120			6
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	740			37
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82	30%			04%			00%			-11%						
		'98	21%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	7599	Dec:	0%			
												'98	6760		2%			
Symphoricarpos oreophilus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	3	-	-	-	-	-	5	-	-	-	100			5
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	32	-	-	12	-	-	-	-	-	44	-	-	-	880	21	30	44
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82	00%			00%			00%									
		'98	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	980		-			

Trend Study 30-46-98

Study site name: Pahcoon Bench .

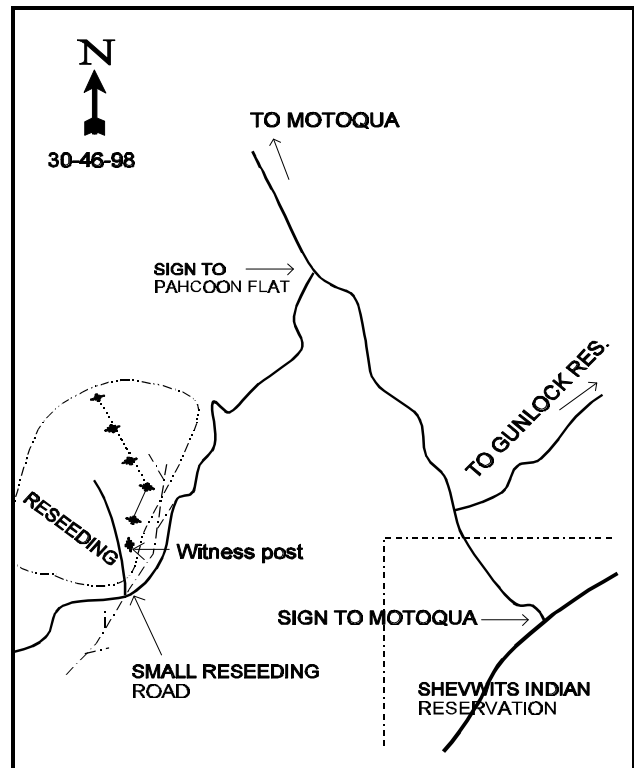
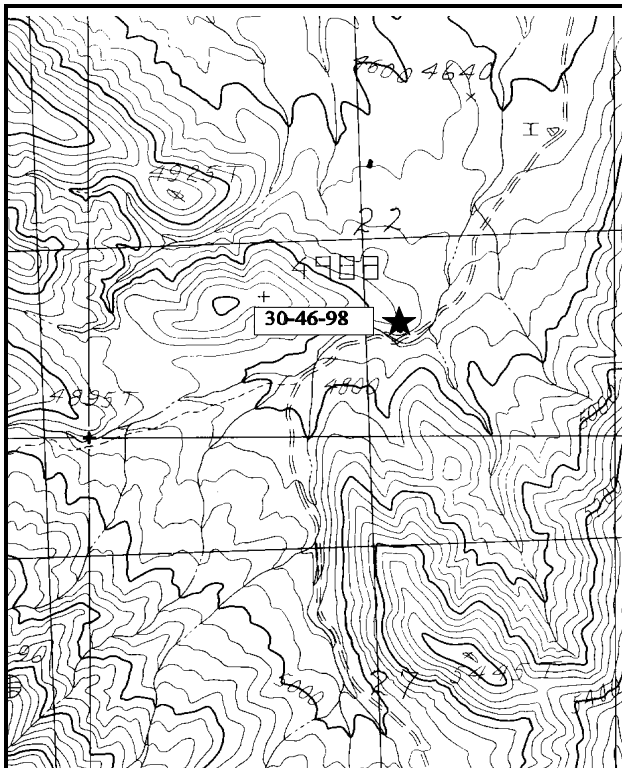
Range type: Chained, Reseeded P-J .

Compass azimuth: frequency baseline 22 M degrees. (Lines 2-4 336°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (18 & 96ft), line 2 (57ft), line 3 (20ft), line 4 (73ft).

LOCATION DESCRIPTION

Proceed past Shivwits approximately 1.0 mile and turn north on the Jackson Springs-Motoqua road. Proceed 6.0 miles on this road past a road towards Gunlock Reservoir until coming to a fork to the left towards Pahcoon Flat. Take the road towards Pahcoon Flat for 3.8 miles, traveling through a reseeded. At 3.8 miles, there will be a small, obscure road to the right. Walk 67 paces up the road to the witness post off the east side of the road. The 0-foot baseline stake is 2.5 paces from the witness post at 22°M. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height. The 0-foot stake is marked by browse tag #471.



Map Name: Shivwits, Utah

Diagrammatic Sketch

Township 41S , Range 18W , Section 22

UTM 4120818.542 N, 247205.810 E

## DISCUSSION

### Trend Study No. 30-46 (50B-9c)

The Pahcocon Bench trend study is on severe winter range on the east side of the Beaver Dam Mountains. The site is at 4,680-foot elevation, near the south end of Pahcocon Flat, on a 1979 chained and seeded pinyon-juniper woodland. The area is dry, yet has responded to treatment. Utilization of the area by cattle and wildlife appears light, even with a guzzler nearby. Pellet group data from 1998 estimate 20 deer and 13 cow days use/acre. Cattle pats appear to be from last fall or winter.

The soil is relatively shallow and moderately rocky. Effective rooting depth (see methods) is estimated at just over 10 inches. Soil texture is a loam with a neutral pH (7.0). Parent material is limestone, some of which has a white calcium carbonate coating. Active erosion is evident, but stabilized due to the minimal slope, the abundance of tree litter, the seeding, and the abundance of cheatgrass. A shallow drainage channel close to the study site shows signs of stabilization. Overall, protective ground cover has increased from 82% in 1982 to 93% by 1998.

Shrub composition is still developing. Key browse species consists of Mountain big sagebrush, with lesser amounts of antelope bitterbrush, and Stansbury cliffrose. Sagebrush is well established, but has declined in density from 4,866 plants/acre in 1982, to 3,400 in 1992, and 800 plants/acre by 1998. The number of dead plants can only explain about 10% of the decrease from 1992, therefore the difference is mostly from the much larger sample size utilized in 1998. The larger sample gives more accurate population estimates for shrubs that have discontinuous and/or clumped distributions. Reproduction has been good in the past with abundant seedlings and young plants sampled in 1982 and 1992. However, current recruitment is poor. Utilization has been light in the past, but some moderate use was reported in 1998. Vigor is normal on most plants and percent decadence has increased since 1982, although it is still low at only 15%.

Secondary browse species, antelope and desert bitterbrush, are also well established and contain healthy age class structures. Individuals are large and vigorous and displayed abundant annual growth in 1992. Utilization of all shrubs appeared light to moderate. During the 1998 reading, all bitterbrush was classified as antelope bitterbrush. There may have been a classification problem between desert bitterbrush and cliffrose in 1982 and 1992. Density of the bitterbrush species was estimated at 732 plants/acre in 1992. This density declined to 60 plants/acre by 1998. Density of cliffrose increased from 66 to 260 plants/acre between 1992 and 1998. There are no dead plants within the population, therefore the changes in density are due to the much larger sample size used in 1998 and confusion between desert bitterbrush and cliffrose. The antelope bitterbrush displayed moderate to heavy use in 1998. Vigor is normal, but reproduction limited. Cliffrose has increased dramatically in size since 1992 according to photo point comparisons. Mature plants currently ('98) average 5 feet in height with a crown diameter of 4 feet. Plants show moderate to heavy use, yet vigor is good and percent decadence low at 8%. Reproduction is also good with a biotic potential of 26%.

Threadleaf snakeweed is the most abundant shrub on the site. It has increased in density dramatically since 1982 when only 466 plants/acre were estimated. By 1992, there were an estimated 3,933 young and mature plants/acre, and an additional 7,933 seedlings/acre. During the 1998 reading, density increased 47% to 7,360 plants/acre. Age class distribution indicates a stable population with 97% of the plants being mature. Juniper trees are also found on the site in small numbers. Point quarter data from 1998 estimate 90 juniper trees/acre with an average basal diameter of 3.3 inches. Of these trees, 21% were larger, tipped over trees that were still alive from the treatment. Average basal diameter of these trees is 7 inches.

Seeded grasses, crested and intermediate wheatgrass, have been fairly successful and appeared to be increasing in 1982. However, quadrat frequencies of perennial grasses remained stable by 1992, then declined in 1998. The annuals, cheatgrass and foxtail brome, are both quite common and have persisted even as perennials become more firmly established. It was noted in the 1982 report that these annual grasses were

expected to decline as seeded grasses became established. On examination of photos taken during both readings, it appears that the opposite is true. Cheatgrass appears to have increased in abundance creating a fire hazard on this site. Currently, these annuals account for 89% of the grass cover.

Forb composition is deficient with all species providing only 2% cover in 1998. The only forb included in the seed mixture was yellow sweetclover which is a short lived perennial. No sweet clover was encountered during any reading. Annual forbs such as *Draba*, storksbill, and *Microsteris gracilis*, dominate the forb composition by producing 95% of the forb cover. The most prominent perennial species is gooseberryleaf globemallow.

#### 1982 APPARENT TREND ASSESSMENT

Soil trend is improving due to the seeding effort. Vegetational trend parameters indicate a rapidly expanding sagebrush population and fairly static populations of secondary shrubs. Increaser shrubs are present, but not currently abundant. A fair to good grass cover appears to be thickening. However, forbs are almost nonexistent and unless inter-seeded, will never be an important vegetation component.

#### 1992 TREND ASSESSMENT

Soil conditions continue to improve. Basal vegetative cover increased by 67%, while bare ground declined by 33%. The browse trend is mixed. Mountain big sagebrush has decreased slightly in density. No young plants were encountered, but abundant seedlings were counted. Secondary species have healthy populations, good vigor, and adequate reproductive potentials. On the down side, threadleaf snakeweed has increased dramatically and is currently the most numerous shrub with an estimated density of 3,933 plants/acre. Age class structure indicates possible further increases. Overall, the browse trend is stable. Herbaceous plants are dominated by seeded grasses and cheatgrass brome. Quadrat frequencies of perennial grasses have not changed since 1982, while cheatgrass appears to have increased creating a fire hazard on this site. Forbs are severely deficient. Only one forb, gooseberryleaf globemallow, was encountered either year. Trend for herbaceous understory is therefore stable to slightly declining and very poor condition.

#### TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable to slightly declining and very poor condition

#### 1998 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1992. Litter cover declined from 71% to 56%, possibly due to classifying dried up cheatgrass as litter in 1982 and 1992. Percent bare ground remained similar. Trend for the key browse species, mountain big sagebrush, cliffrose, and bitterbrush, is mixed. Sagebrush density is declining, with cliffrose and bitterbrush appearing stable. There appears to have been an identification problem with desert bitterbrush and cliffrose in the past. Utilization of all shrubs has increased since 1992, but vigor remains normal and percent decadence low. Some of the changes in density are also due to the much larger sample used in 1998. Overall, the browse trend is considered down slightly. Trend for the herbaceous understory is down and in poor condition due to the dominance of annual cheatgrass and foxtail brome. Sum of nested frequency of perennial grasses has declined. Frequency of perennial forbs increased slightly, although forbs are still scarce. Nested frequency for intermediate wheatgrass declined significantly.

# TREND ASSESSMENT

soil - stable

browse - down slightly

herbaceous understory - down and in poor condition

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 46

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron cristatum	44	52	38	26	22	1.23
G	Agropyron intermedium	136	*78	49	56	32	1.87
G	Agropyron trachycaulum	-	1	-	-	1	.03
G	Bromus rubens (a)	-	169	-	-	65	4.65
G	Bromus tectorum (a)	-	366	-	-	97	29.75
G	Elymus junceus	3	-	1	1	-	-
G	Poa pratensis	4	-	-	1	-	-
G	Poa secunda	-	4	-	-	2	.01
G	Sitanion hystrix	-	1	-	-	1	.00
G	Sporobolus cryptandrus	4	-	1	2	-	-
G	Vulpia octoflora (a)	-	94	-	-	38	1.13
Total for Annual Grasses		0	629	0	0	200	35.54
Total for Perennial Grasses		191	136	89	86	58	3.14
Total for Grasses		191	765	89	86	258	38.68
F	Allium spp.	-	2	-	-	1	.01
F	Astragalus spp.	-	2	-	-	2	.01
F	Calochortus nuttallii	-	7	-	-	3	.01
F	Descurainia pinnata (a)	-	7	-	-	2	.01
F	Draba spp. (a)	-	102	-	-	41	.31
F	Erodium cicutarium (a)	-	28	-	-	10	.73
F	Gilia spp. (a)	-	3	-	-	1	.00
F	Lychnis drummondii	-	*8	-	-	5	.05
F	Microsteris gracilis (a)	-	154	-	-	58	.64
F	Plantago patagonica (a)	-	28	-	-	12	.13
F	Sphaeralcea grossulariaefolia	4	3	11	3	1	.00
Total for Annual Forbs		0	322	0	0	124	1.83
Total for Perennial Forbs		4	22	11	3	12	0.08
Total for Forbs		4	344	11	3	136	1.92

\* Indicates significant difference at % = 0.10 (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 46

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata vaseyana</i>	26	4.31
B	<i>Chrysothamnus parryi howardi</i>	-	.15
B	<i>Cowania mexicana stansburiana</i>	12	1.52
B	<i>Ephedra viridis</i>	1	.63
B	<i>Gutierrezia microrcephala</i>	69	6.17
B	<i>Juniperus osteosperma</i>	7	2.75
B	<i>Opuntia spp.</i>	3	.00
B	<i>Prunus fasciculata</i>	5	-
B	<i>Purshia glandulosa</i>	0	-
B	<i>Purshia tridentata</i>	3	1.48
B	<i>Quercus turbinella</i>	0	-
B	<i>Yucca baccata baccata</i>	0	-
Total for Browse		126	17.03

## CANOPY COVER --

Herd unit 30 , Study no: 46

Species	Percent Cover '98
<i>Cowania mexicana stansburiana</i>	.80
<i>Juniperus osteosperma</i>	3
<i>Pinus monophylla</i>	.20

## BASIC COVER --

Herd unit 30 , Study no: 46

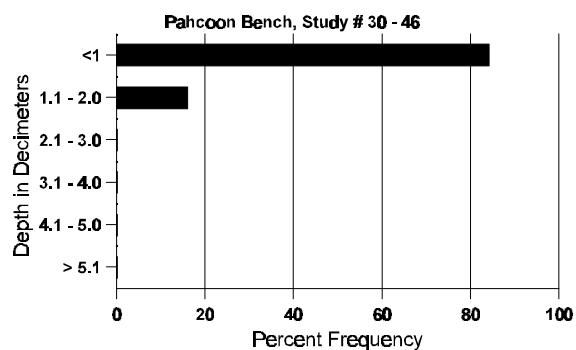
Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	389	1.50	5.50	53.28
Rock	224	5.75	7.25	10.22
Pavement	277	7.25	8.50	9.86
Litter	395	73.75	70.50	55.49
Cryptogams	108	0	0	1.21
Bare Ground	251	11.75	8.25	7.42

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 46, Study Name: Pahcoon Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.3	50.4 (14.4)	7.0	48.0	33.4	18.6	2.6	12.6	108.8	.8

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 46

Type	Quadrat Frequency '98
Rabbit	34
Deer	33
Cattle	3

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 46

A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	82	11	-	-	-	-	-	-	-	-	11	-	-	-	733			11
	92	100	-	-	4	-	-	-	-	-	104	-	-	-	6933			104
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	82	50	-	-	-	-	-	-	-	-	50	-	-	-	3333			50
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	82	23	-	-	-	-	-	-	-	-	23	-	-	-	1533	25	19	23
	92	47	-	-	1	-	-	-	-	-	48	-	-	-	3200	28	28	48
	98	27	6	-	-	-	-	-	-	-	33	-	-	-	660	28	36	33
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	98	3	2	-	1	-	-	-	-	-	5	-	-	1	120			6
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%			-30%				
		'92			00%			00%			00%			-76%				
		'98			20%			00%			03%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	4866	Dec:	0%			
												'92	3400		6%			
												'98	800		15%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cowania mexicana stansburiana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	28	28	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66	57	44	
	98	6	4	2	-	-	-	-	-	-	12	-	-	-	240	61	52	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			00%			00%			+75%							
'98		31%			15%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	0%			
												'92	66		0%			
												'98	260		8%			
Ephedra viridis																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	30	38	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia microrcephala																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	119	-	-	-	-	-	-	-	-	-	-	-	-	7933		119	
	98	4	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	-	-	-	-	200		3	
	98	8	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
M	82	7	-	-	-	-	-	-	-	-	7	-	-	-	466	13	11	
	92	54	-	-	2	-	-	-	-	-	56	-	-	-	3733	14	15	
	98	356	-	-	-	-	-	-	-	-	356	-	-	-	7120	9	12	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	4	-	-	-	-	-	-	-	-	-	-	-	4	80		4	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+88%							
'92		00%			00%			00%			+47%							
'98		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	466	Dec:	0%			
												'92	3933		0%			
												'98	7360		1%			
Juniperus osteosperma																		
S	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	2	-	-	-	-	-	1	-	-	3	-	-	-	60	-	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+53%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	66		-			
												'98	140		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	2	-	-	-	-	-	-	-	-	-	2	-	-	40	8 20	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	60		-			
Prunus fasciculata																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	60	51 72	3	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'92	0		0%			
												'98	100		20%			
Purshia glandulosa																		
Y	82	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	92	-	-	-	4	-	-	-	-	-	4	-	-	-	266		4	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	1	-	-	-	-	-	-	-	1	-	-	-	66	32 44	1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		25%			00%			00%			+ 0%							
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	266	Dec:	-			
												'92	266		-			
												'98	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	4	2	-	-	-	-	-	-	-	6	-	-	-	400	34	6	
	98	-	-	2	-	1	-	-	-	-	3	-	-	-	60	47	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		29%			00%			00%			-87%							
'98		33%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	466		-			
												'98	60		-			
Quercus turbinella																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	0		-			
												'98	0		-			
Yucca baccata baccata																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	1	1	-	-	-	-	-	-	-	2	-	-	-	133	7	2	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		50%			00%			00%			+34%							
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	-			
												'92	200		-			
												'98	0		-			

Trend Study 30-47-98

Study site name: Lost Peak.

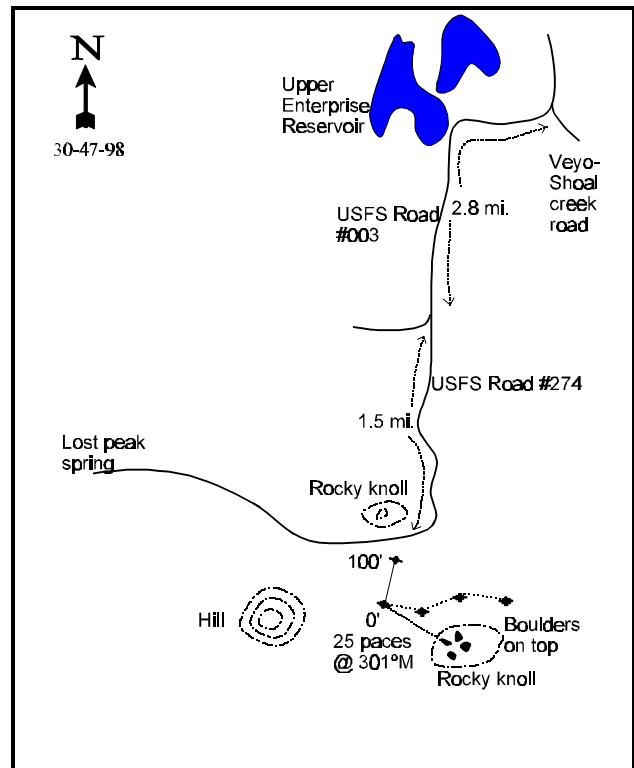
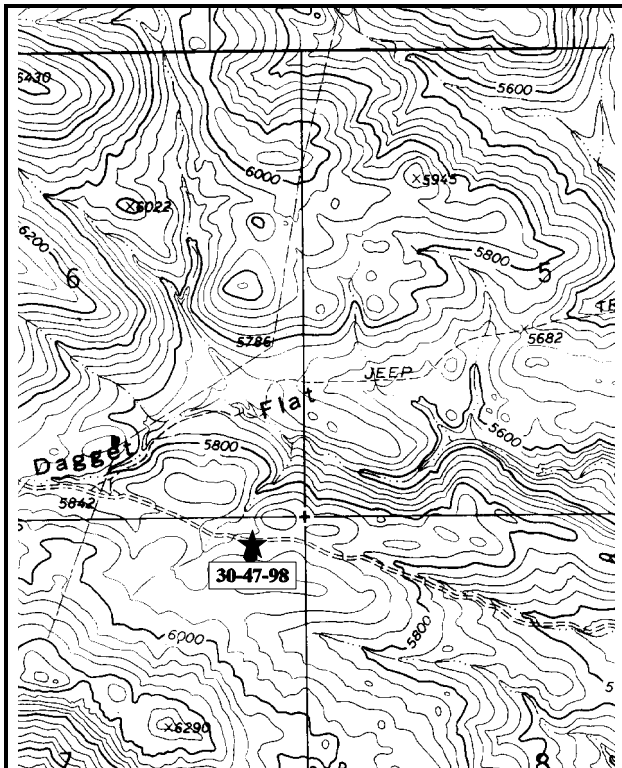
Range type: Oakbrush.

Compass azimuth: frequency baseline 14 M degrees. (Line 2 98°M, line 3 68°M, line 4 93°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (8 & 97ft), line 2 (38ft), line 3 (52ft), line 4 (69ft).

## LOCATION DESCRIPTION

From Upper Enterprise Reservoir, take the Lost Creek Road towards Lost Peak Spring. This road is USFS Road # 003. Travel south for 2.8 miles to a fork. At the fork turn left on USFS Road #274. Continue 1.5 miles to a sharp turn to the right (west). On the south side of the road are a couple of small knolls. The farthest one to the east has a rock outcrop on top of it. From the rock outcrop, the 0-foot baseline stake is 25 paces away at 301 degrees magnetic. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.

Map name: Goldstrike, Utah

### Diagrammatic Sketch

Township 38 S, Range 18 W, Section 20.

UTM 4150242.988 N, 243855.263 E

## DISCUSSION

### Trend Study No. 30-47 (61C-10)

The Lost Peak trend study is the highest elevation summer range study on the west side of unit 30 at approximately 6,750 feet. The study samples mixed mountain brush range type, characterized as oakbrush intermixed with isolated patches of basin big sagebrush. The site consists of a saddle surrounded on 3 sides by rocky knolls. Deer use appeared heavy in 1982 with abundant pellet groups, heavy utilization of forage plants, and about 40 deer (primarily does and fawns) seen during study site establishment. Pellet group data from the site in 1998 estimate 40 deer and 10 cow days use/acre, with pellet groups concentrated in openings around thick oakbrush and serviceberry.

Soil at the site is moderately deep with an effective rooting depth (see methods) averaging 24 inches. Soil depth is more shallow near the rocky knolls where rock is more concentrated on the surface. Soil texture is a sandy loam with a strongly acid pH (5.3). Ground cover is principally litter from oak and serviceberry with bare ground concentrated in shrub interspaces. There is limited evidence of soil movement here.

Key browse species consist of Utah serviceberry and Gambel oakbrush. Density of serviceberry was estimated at only 266 plants/acre in 1982 because the density plots were concentrated in areas where oakbrush was dominant. A much larger sample was taken in 1998 with the original 100 foot baseline extended to 400 feet. More of the preferred serviceberry was sampled with the new layout. Due to the thick nature of the serviceberry, individual plants were impossible to differentiate so stems were counted. Current ('98) density is estimated at 11,980 stems/acre which provides 47% of the shrub cover. Use is moderate to heavy where available. Vigor is normal and few decadent plants were encountered. Gambel oak presently provides 25% of the browse cover with an estimated density of 6,560 stems/acre in 1998. Oak grows in thick clones with plants becoming unavailable due to height in some places. Most is lightly utilized with normal vigor and low percent decadence. Density has increased since 1982 primarily due to the larger sample used in 1998.

Important understory shrubs include: basin big sagebrush, mountain big sagebrush, currant, and snowberry. These shrubs grow in patches around oak and serviceberry thickets. They show mostly light use.

The herbaceous understory is fairly abundant with forbs providing 57% of the herbaceous cover. Five species of perennial grass provide a relatively sparse cover in shrub interspaces. The most abundant grass is annual cheatgrass which contributes 74% of the grass cover. The only common perennial grasses are mountain brome and mutton bluegrass. Perennial forbs are common and produce 49% of the herbaceous cover. Common species include: wild onion, arrowleaf balsamroot, silvery lupine, and American vetch.

### 1982 APPARENT TREND ASSESSMENT

Soil and vegetative trends are both stable. Although some barren places exist and soil movement is noticeable, there is not currently a serious problem. The browse component seems healthy, especially Gambel oak, and may be expanding at the expense of a somewhat depleted grass understory. Forb composition and numbers are fair, but may decline if the shrub component gains further dominance.

### 1998 TREND ASSESSMENT

Trend for soil is stable with similar amounts of bare ground compared to 1982. Litter and vegetative cover are abundant and adequately protect the ground surface from erosion. Trend for browse is up. The increase in density of key browse species is primarily due to the larger sample used in 1998. However, the biotic potentials and proportions of young plants for serviceberry and oak have increased dramatically indicating an expanding population. Serviceberry is the more preferred and displays moderate to heavy use, good vigor, and low decadence. Trend for the herbaceous understory is up. Quadrat frequency of perennial grasses and forbs has increased since 1982. Forbs are abundant and contain several preferred species.

# TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - up

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 47

T y p e	Species	Nested Frequency 08	Quadrat Frequency '82 '98		Average Cover % 08
G	Agropyron dasystachyum	32	1	12	.13
G	Agropyron intermedium	5	-	2	.06
G	Bromus carinatus	36	5	14	1.23
G	Bromus tectorum (a)	237	-	72	9.72
G	Poa fendleriana	48	3	18	2.00
G	Sitanion hystrix	4	8	2	.01
Total for Annual Grasses		237	0	72	9.72
Total for Perennial Grasses		125	17	48	3.44
Total for Grasses		362	17	120	13.16
F	Agoseris glauca	44	-	23	.49
F	Allium spp.	121	-	41	1.38
F	Arabis spp.	3	1	2	.03
F	Arenaria spp.	4	-	2	.18
F	Artemisia ludoviciana	43	24	16	.66
F	Aster spp.	1	-	1	.00
F	Astragalus spp.	4	2	2	.06
F	Astragalus utahensis	3	-	1	.03
F	Balsamorhiza sagittata	20	1	10	3.34
F	Collinsia parviflora (a)	92	-	38	1.56
F	Comandra pallida	-	1	-	-
F	Cymopterus spp.	10	-	5	.51
F	Delphinium nuttallianum	3	-	1	.00
F	Descurainia pinnata (a)	1	-	1	.00
F	Draba spp. (a)	2	-	1	.00
F	Epilobium paniculatum (a)	4	-	1	.15
F	Erigeron eatonii	4	1	2	.06
F	Eriogonum racemosum	2	-	1	.00
F	Fritillaria atropurpurea	3	-	1	.03
F	Galium boreale	13	-	6	.05
F	Hydrophyllum occidentale	14	-	6	.27
F	Lappula occidentalis (a)	4	-	2	.15

Type	Species	Nested Frequency '98	Quadrat Frequency		Average Cover % '98
			'82	'98	
F	Lomatium spp.	6	-	2	.30
F	Lupinus argenteus	88	29	39	4.14
F	Microsteris gracilis (a)	66	-	26	.50
F	Penstemon spp.	2	-	1	.03
F	Phlox longifolia	23	29	9	.19
F	Polygonum douglasii (a)	4	-	1	.00
F	Senecio multilobatus	6	6	3	.06
F	Sphaeralcea coccinea	2	-	1	.03
F	Stellaria jamesiana	3	-	3	.01
F	Vicia americana	111	34	48	2.80
F	Viguiera multiflora	3	-	1	.00
Total for Annual Forbs		173	0	70	2.38
Total for Perennial Forbs		536	128	227	14.73
Total for Forbs		709	128	297	17.12

#### BROWSE TRENDS --

Herd unit 30 , Study no: 47

Type	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	63	24.22
B	Artemisia tridentata tridentata	4	.56
B	Artemisia tridentata vaseyana	18	2.67
B	Chrysothamnus viscidiflorus	3	.03
B	Opuntia spp.	3	.30
B	Pinus monophylla	1	1.00
B	Quercus gambelii	50	12.69
B	Ribes spp.	6	1.72
B	Symphoricarpos oreophilus	23	8.35
B	Tetradymia canescens	0	-
Total for Browse		171	51.56

#### CANOPY COVER --

Herd unit 30 , Study no: 47

Species	Percent Cover '98
Pinus monophylla	.80
Quercus gambelii	2

# BASIC COVER --

Herd unit 30 , Study no: 47

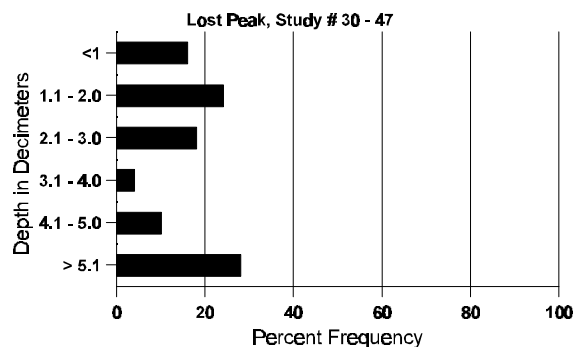
Cover Type	Nested Frequency '98	Average Cover % '82 '98	
Vegetation	362	2.25	65.90
Rock	97	1.25	7.85
Pavement	39	0	.14
Litter	386	83.75	64.97
Cryptogams	-	.25	0
Bare Ground	128	12.50	13.34

# SOIL ANALYSIS DATA --

Herd Unit 30, Study # 47, Study Name: Lost Peak

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
24.0	44.6 (17.7)	5.3	72.0	13.4	14.6	2.4	13.9	169.6	.4

## Stoniness Index



# PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 47

Type	Quadrat Frequency '98
Rabbit	2
Deer	23
Cattle	1

## BROWSE CHARACTERISTICS --

Herd unit 30, Study no: 47

Field unit 36 ; Study no. 47																		
A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	14	-	-	41	-	-	-	-	-	55	-	-	-	1100			55
Y	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	98	5	-	-	151	-	-	-	-	-	156	-	-	-	3120			156
M	82	1	6	-	-	-	-	-	-	-	4	-	3	-	233	59	38	7
	98	32	236	107	2	34	5	4	-	-	420	-	-	-	8400	45	38	420
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	11	5	-	3	2	-	-	-	12	-	-	11	460			23
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	380			19
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		75%			00%			38%			+98%							
'98		47%			20%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	266	Dec:	0%			
*stems/acre counted in '98												'98	11980		4%			
Artemisia tridentata tridentata																		
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	33	26	39	1
	98	4	-	-	1	-	-	-	-	-	5	-	-	-	100	19	27	5
D	82	5	-	-	-	-	-	-	-	-	4	-	1	-	166			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			13%			-62%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	265	Dec:	63%			
												'98	100		0%			
Artemisia tridentata vaseyana																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	5	-	-	1	-	-	-	-	-	5	1	-	-	120			6
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	17	1	-	2	-	-	-	-	-	20	-	-	-	400	25	34	20
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'98		04%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	0%			
												'98	560		7%			
Chrysothamnus viscidiflorus																		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	4	-	-	-	-	-	-	-	-	-	4	-	-	80	14	29	4
		% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
		'82		00%			00%			00%								
		'98		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	80		-			
Chrysothamnus viscidiflorus viscidiflorus																		
M	82	2	1	-	-	-	-	-	-	-	3	-	-	-	100	12	12	3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
		% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
		'82		33%			00%			00%								
		'98		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'82	100	Dec:	-			
												'98	0		-			
Opuntia spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	4	-	-	1	-	-	-	-	-	3	-	2	-	100	7	19	5
		% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
		'82		00%			00%			00%								
		'98		00%			00%			40%								
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	100		-			
Pinus monophylla																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
		% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
		'82		00%			00%			00%								
		'98		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	10	-	-	11	-	-	6	-	-	27	-	-	-	540			27
Y	82	-	-	-	-	-	-	4	-	-	4	-	-	-	133			4
	98	65	-	-	72	-	-	26	-	-	163	-	-	-	3260			163
M	82	56	7	5	-	-	-	-	-	-	68	-	-	-	2266	37	20	68
	98	109	16	-	14	-	-	7	6	-	136	-	16	-	3040	43	32	152
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	12	-	-	-	-	-	-	1	-	10	-	-	3	260			13
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		10%			07%			00%			+63%							
'98		05%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	2399	Dec:	0%			
												'98	6560		4%			
Ribes spp.																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	4	-	-	2	-	-	-	-	-	6	-	-	-	120	42	44	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	120		-			
Ribes velutinum velutinum																		
D	82	-	1	-	-	-	-	-	-	-	-	-	-	1	33			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		100%			00%			100%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	33	Dec:	100%			
												'98	0		0%			
Symphoricarpos oreophilus																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	1	-	-	3	-	-	6	-	-	-	120			6
M	82	17	-	-	-	-	-	-	-	-	17	-	-	-	566	21	13	17
	98	38	-	-	49	-	-	58	-	-	145	-	-	-	2900	21	44	145
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+81%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	566	Dec:	0%			
												'98	3040		1%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Tetradymia canescens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	11	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%										
		'98			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82		0	Dec:	-		
												'98		0		-		

Trend Study 30-52-98

Study site name: Northwest of Enterprise .

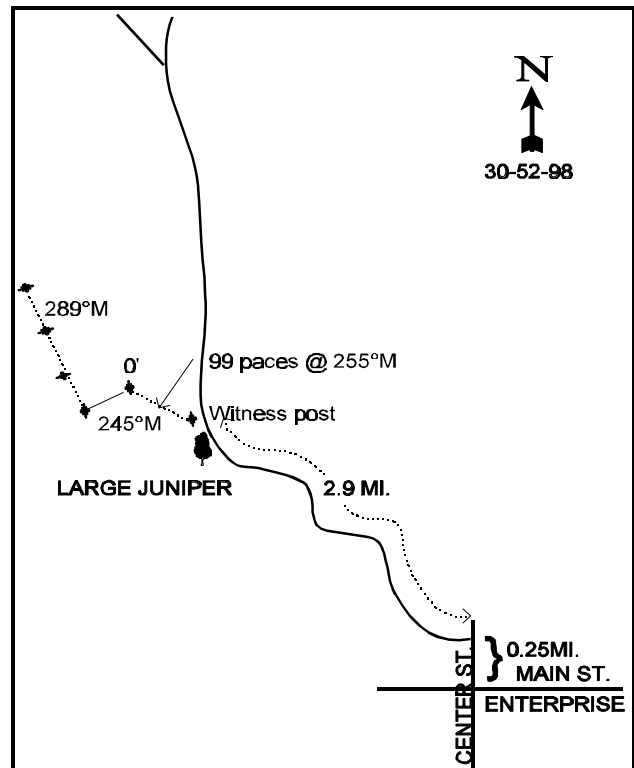
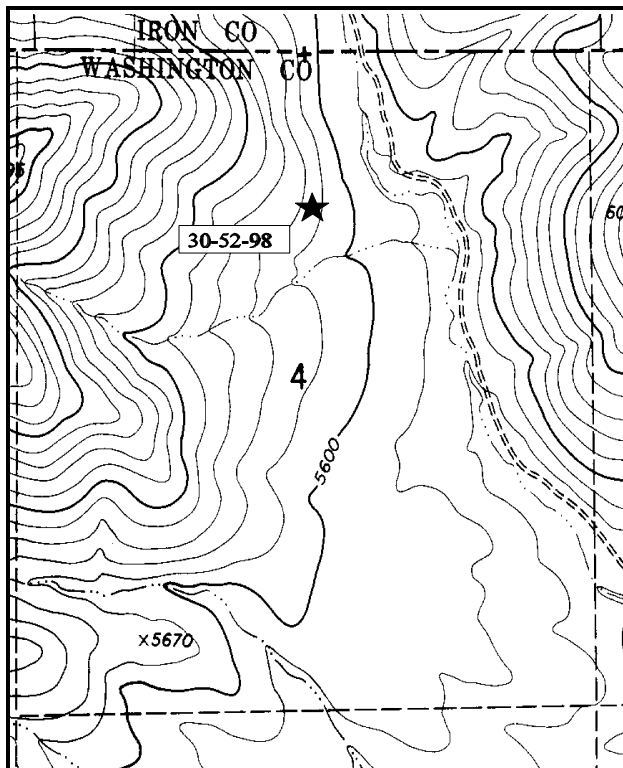
Range type: Sagebrush-Grass .

Compass azimuth: frequency baseline 245 M degrees. (Line 2-4 289°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (8 & 94ft), line 2 (37ft), line 3 (51ft), line 4 (63ft).

LOCATION DESCRIPTION

Starting from the town of Enterprise, turn north on Center Street for 0.25 miles. Turn left (i.e., west) and travel 2.90 miles. Stop where the road makes a turn to the north. On the left side of the road, before the bend, are a few junipers. Past the junipers is a witness post on the left side of the road. From the witness post the 0-foot baseline stake is 99 paces away at an azimuth of 255 degrees magnetic. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.



Map Name: Hebron, Utah

Diagrammatic Sketch

Township 37 S , Range 17 W , Section 4

UTM 4165064.043 N, 256229.918 E

## DISCUSSION

### Trend Study No. 30-52 (50B-1c)

The “Northwest of Enterprise” trend study is on critical deer winter range northwest of Enterprise. Elevation is approximately 5,700 feet with a moderately steep slope (25%) and northeast aspect. The range type is Wyoming big sagebrush-grass. Little sign of deer was noted during the 1992 reading. Pellet group data from 1998 estimate 40 deer and 2 cow days use/acre. Site placement is questionable for sampling winter range. A short distance away to the north is a more preferred cliffrose and sagebrush type on a south exposure which would attract more deer during winter months.

Soils are relatively deep and rocky on the surface and within the profile. Effective rooting depth (see methods) is estimated at 19 inches. Rock and erosion pavement made up 26% of the ground cover in 1982, increasing to 42% in 1992, and 43% by 1998. The upper part of the site is very rocky as soil has moved down slope. There are signs of past erosion in the form of soil pedestaling and terracing of the slope, but current litter and vegetative cover seem to be sufficient to hold the soil in place.

The key browse species is Wyoming big sagebrush which currently ('98) comprises 55% of browse cover. The sight is composed of an over mature stand of sagebrush, which has steadily declined in density from 6,733 plants/acre in 1982 to 2,660 by 1998. Utilization was moderate to heavy in 1982 and 1992, however current use is more light to moderate. Percent decadence has increased from 23% in 1982 to 48% in 1998. Vigor is currently good on most plants, but 41% of the decadent sagebrush were classified as dying. Reproduction is poor with dead plants nearly as numerous as mature plants (1,180 vs 1,160 plants/acre).

Cliffrose provides some additional forage with an estimated 380 plants/acre in 1998. It has received moderate to heavy use, yet vigor is normal and reproduction is good. The only other browse species of significance is broom snakeweed. Normally, it acts as an increaser in response to grazing or disturbance. However, in this case it does not appear to be especially aggressive, as it has declined steadily in density since 1982. Juniper trees are scattered throughout the site. Point quarter data from 1998 estimate 20 trees/acre with an average basal diameter of 8 inches. Overhead canopy cover averages 8%, which means that it can be effecting the loss of productivity of the understory by as much as 30-40%.

Perennial grasses are abundant and diverse with muttongrass and Sandberg bluegrass being the most common. Annual cheatgrass is also present, providing 17% of the grass cover. Forbs are fairly diverse, yet no species is common. The 12 annual and perennial forbs encountered in 1998 provide less than 1% total cover. The most common species include: deervetch, longleaf phlox, and an astragalus.

### 1982 APPARENT TREND ASSESSMENT

This study is fairly typical of depleted Wyoming big sagebrush range. Most parameters indicate soil and vegetative trend are both declining. Erosion is extensive and increaser and/or invader plants occupy a prominent place in the plant composition. The key species, Wyoming big sagebrush, does not appear to be maintaining itself. Direct management action will likely be required to reverse the trend. Restrictions on animal use, while a viable option, are unlikely to quickly bring the site to a productive state.

### 1992 TREND ASSESSMENT

Basal vegetative cover has more than doubled since 1982, while percent bare ground had decreased by 38%. Protective ground cover has increased from 87% to 92%. All other observations point to an improving soil trend. The key browse species, Wyoming big sagebrush, has a low reproductive potential, no recruitment, density has declined by 42%, and percent decadency has increased. On the positive side, utilization is lighter and vigor has improved. Broom snakeweed had declined in density by 34%. Overall, the browse trend is

down. Sum of nested quadrat frequencies for grasses are down slightly, while forbs have increased. Combined, summed quadrat frequencies of forbs and grasses have remained constant since the previous reading.

#### TREND ASSESSMENT

soil - improved

browse - down

herbaceous understory - stable

#### 1998 TREND ASSESSMENT

Trend for soil is down slightly. Percent bare ground has increased from 8% to 13% and litter cover has declined from 46% to 38%. However, erosion is not currently the main problem. Trend for browse is down. Density of Wyoming big sagebrush has steadily declined since 1982 even though heavy utilization has declined since 1992. Percent decadence has remained high (48%), vigor is poor on 42% of the decadent plants, and reproduction is not sufficient to maintain the population. Cliffrose is also found on the site in small numbers. Density has increased from 133 plants/acre to 380. This increase in density from 1992 to 1998 is mostly due to the much larger sample taken in 1998. Reproduction is good. Utilization of this preferred shrub is moderate to heavy. Trend for the herbaceous understory is up for perennial grasses, but stable for forbs which only make up 4% of the herbaceous cover. Sum of nested frequency of perennial grasses has increased dramatically with a significant increase in the frequency of mutton and Sandberg bluegrass.

#### TREND ASSESSMENT

soil - down slightly

browse - down for Wyoming big sagebrush

herbaceous understory - up, but very few forbs

#### HERBACEOUS TRENDS --

Herd unit 30 , Study no: 52

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
G	Agropyron smithii	68	44	31	28	18	.55
G	Bromus tectorum (a)	-	261	-	-	88	3.09
G	Hilaria jamesii	55	81	32	21	34	1.78
G	Koeleria cristata	2	2	2	1	1	.03
G	Oryzopsis hymenoides	11	1	-	5	1	.00
G	Poa fendleriana	60	*101	28	29	42	5.88
G	Poa secunda	41	*215	-	17	79	5.57
G	Sitanion hystrix	54	54	50	24	23	.92
G	Unknown grass - perennial	3	-	-	1	-	-
G	Vulpia octoflora (a)	-	67	-	-	26	.30
Total for Annual Grasses		0	328	0	0	114	3.40
Total for Perennial Grasses		294	498	143	126	198	14.76
Total for Grasses		294	826	143	126	312	18.17

Type	Species	Nested Frequency		Quadrat Frequency			Average Cover %
		'02	'08	'82	'92	'98	
F	Antennaria rosea	-	3	-	-	2	.03
F	Astragalus spp.	5	11	-	3	4	.19
F	Calochortus nuttallii	3	*16	1	1	7	.03
F	Chaenactis douglasii	-	-	1	-	-	-
F	Collinsia parviflora (a)	-	18	-	-	8	.04
F	Cymopterus spp.	-	*6	-	-	4	.07
F	Draba spp. (a)	-	20	-	-	10	.05
F	Erigeron pumilus	-	1	-	-	1	.03
F	Eriogonum umbellatum	2	-	-	1	-	-
F	Lotus plebeius	94	*39	35	40	20	.18
F	Machaeranthera canescens	3	-	-	1	-	-
F	Microsteris gracilis (a)	-	25	-	-	11	.05
F	Phlox longifolia	15	*32	-	8	16	.11
F	Plantago patagonica (a)	-	4	-	-	2	.01
F	Sisymbrium altissimum (a)	-	2	-	-	1	.00
Total for Annual Forbs		0	69	0	0	32	0.16
Total for Perennial Forbs		122	108	37	54	54	0.65
Total for Forbs		122	177	37	54	86	0.81

\* Indicates significant difference at % = 0.10 (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 52

Type	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	1	-
B	Artemisia tridentata wyomingensis	76	9.16
B	Chrysothamnus nauseosus	-	.38
B	Chrysothamnus viscidiflorus	14	.51
B	Cowania mexicana stansburiana	12	.49
B	Ephedra viridis	0	-
B	Gutierrezia sarothrae	54	1.14
B	Juniperus osteosperma	2	5.09
B	Purshia tridentata	1	-
Total for Browse		160	16.79

CANOPY COVER --

Herd unit 30 , Study no: 52

Species	Percent Cover '98
Juniperus osteosperma	8

BASIC COVER --

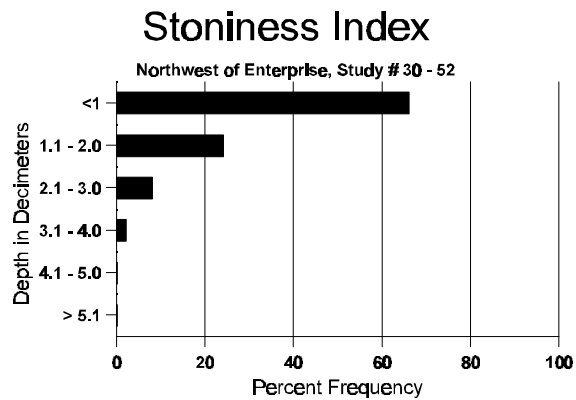
Herd unit 30 , Study no: 52

Cover Type	Nested Frequency '98	Average Cover %		
		'82	'92	'98
Vegetation	356	1.50	4.25	38.27
Rock	335	20.25	30.50	36.20
Pavement	240	6.25	10.75	6.67
Litter	383	56.75	45.75	38.02
Cryptogams	111	2.25	.75	2.40
Bare Ground	263	13.00	7.50	13.41

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 52, Study Name: Northwest of Enterprise

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.9	48.0 (17.7)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 52

Type	Quadrat Frequency '98
Rabbit	10
Horse	1
Deer	16

## BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 52

Field unit 56, Study no. 52																		
A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'82		00%				00%				00%								
'92		00%				00%				00%								
'98		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)										'82		0		Dec:		0%		
										'92		0				0%		
										'98		20				100%		
Artemisia tridentata wyomingensis																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	82	6	3	-	-	-	-	-	-	-	9	-	-	-	600		9	
	92	2	1	-	-	-	-	-	-	-	3	-	-	-	200		3	
	98	9	-	-	1	-	-	-	-	-	10	-	-	-	200		10	
M	82	31	23	15	-	-	-	-	-	-	54	14	-	1	4600	22 23	69	
	92	3	17	6	-	-	-	-	1	-	26	1	-	-	1800	24 24	27	
	98	42	16	-	-	1	-	-	-	-	59	-	-	-	1180	19 28	59	
D	82	8	7	8	-	-	-	-	-	-	-	-	1	22	1533		23	
	92	9	18	2	-	-	-	-	-	-	25	3	1	-	1933		29	
	98	49	13	-	-	-	-	-	-	-	36	-	-	26	1280		64	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1160		58	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'82		33%				23%				24%				-42%				
'92		61%				14%				02%				-32%				
'98		23%				00%				20%								
Total Plants/Acre (excluding Dead & Seedlings)										'82		6733		Dec:		23%		
										'92		3933				49%		
										'98		2660				48%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	7	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	14	
	98	28	-	-	-	-	-	-	-	-	28	-	-	-	560	11	18	
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			+ 0%							
'92		00%			00%			00%			+92%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	0%			
												'92	66		0%			
												'98	800		3%			
Cowania mexicana stansburiana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	98	4	1	1	-	-	-	-	-	-	6	-	-	-	120		6	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	1	3	5	-	1	3	-	-	-	13	-	-	-	260	31	25	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%			+65%							
'98		26%			47%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'92	133		-			
												'98	380		-			
Ephedra viridis																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	2	-	-	-	-	-	3	-	-	-	200		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	82	1	1	-	-	-	-	-	-	-	2	-	-	-	133	11	6	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	32	51	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		50%			00%			00%			+34%							
'92		33%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	133	Dec:	-			
												'92	200		-			
												'98	0		-			
Gutierrezia sarothrae																		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	82	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	27	-	-	-	-	-	-	-	-	27	-	-	-	540			27
M	82	99	-	-	-	-	-	-	-	-	85	14	-	-	6600	8	11	99
	92	82	-	-	-	-	-	-	-	-	82	-	-	-	5466	11	10	82
	98	162	-	-	7	-	-	-	-	-	169	-	-	-	3380	6	8	169
D	82	17	-	-	-	-	-	-	-	-	9	-	-	8	1133			17
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	7	-	-	-	-	-	-	-	-	2	-	-	5	140			7
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			06%			-34%							
'92		00%			00%			00%			-26%							
'98		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	8266	Dec:		14%		
												'92	5466			0%		
												'98	4060			3%		
Juniperus osteosperma																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	82	-	-	-	1	-	-	-	-	-	1	-	-	-	66	67	131	1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	1	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:		-		
												'92	0			-		
												'98	40			-		
Purshia tridentata																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'92		00%			00%			00%										
'98		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:		-		
												'92	0			-		
												'98	20			-		

Trend Study 30-53-98

Study site name: Sevy Hollow .

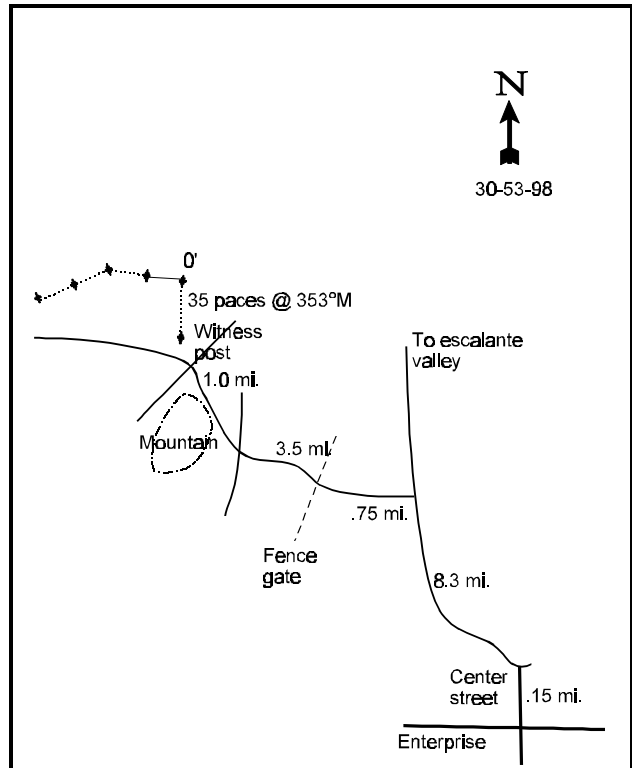
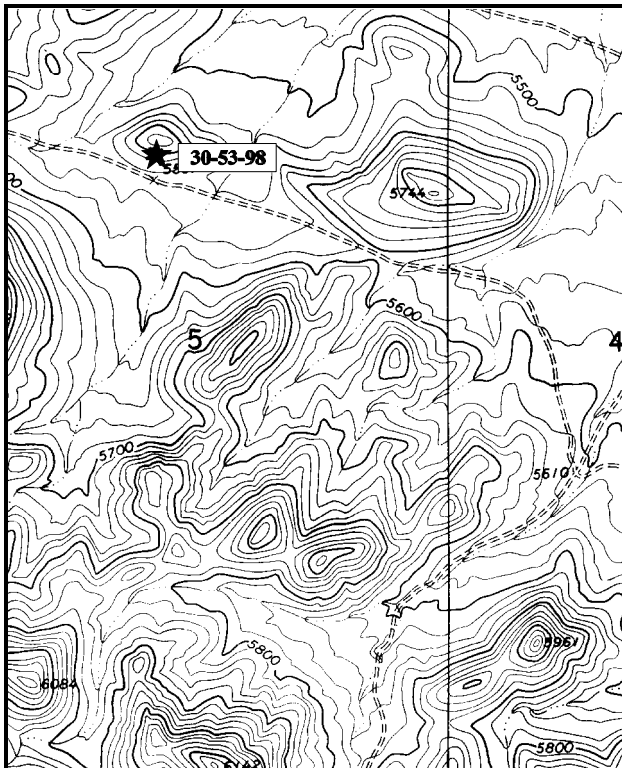
Range type: Sagebrush-Grass

Compass azimuth: frequency baseline 282 M degrees. Lines 3-4 252 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (5 & 93ft), line 2 (28ft), line 3 (52ft), line 4 (72ft).

LOCATION DESCRIPTION

From the town of Enterprise, turn north on Center Street for 0.15 miles, turn left (northwest) for 8.3 miles. At this point, there will be a fork in the road. The main road will go to the right to Escalante Valley. Go to the left for 0.75 miles. You will come to a gate. Go through the gate and continue 3.5 miles through thick pinyon-juniper. You will come to an intersection, at which point bear to the right on the road heading straight ahead (northwest) for 1.0 miles to another intersection and a witness post. From the witness post, the 0-foot baseline stake is 35 paces away at a bearing of 353 degrees magnetic. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. The 0-foot stake is marked with browse tag number 7012.



Map Name: Mount Escalante, Utah

Diagrammatic Sketch

Township 36 S , Range 18 W , Section 5

UTM 4175977.624 N, 245134.119 E

## DISCUSSION

### Trend Study No. 30-53 (61C-2)

The Sevy Hollow trend study is on the southeast exposure of a small knoll just west of Lower Sevy Hollow. Elevation is approximately 5,660 feet with a 20% to 25% slope. The site is a sagebrush-grass range type that appears to becoming negatively effected by increasing numbers of singleleaf pinyon and Utah juniper trees. The site is considered winter range for deer, but use is low. Pellet group data from 1998 estimate only 5 deer days use/acre. Wild horses are using the area and several animals were seen near the site in 1998. Pellet group data estimates 4 horse days use/acre. A few cattle pats were also encountered.

The soil is rocky and appears shallow, but effective rooting depth (see methods) is estimated at almost 22 inches. Soil texture is a sandy loam with a strongly acid pH (5.3). Rocks and pavement are common on the surface, accounting for half of the ground cover. Erosion is not currently a problem due to the high amount of protective ground cover and armored surface of rock cover.

Aside from the pinyon and juniper trees, browse composition is limited to Wyoming big sagebrush, broom snakeweed, narrowleaf low rabbitbrush, and prickly pear. Wyoming big sagebrush currently ('98) provides 64% of the browse cover. Age structure composition indicates that a problem exists. No young or seedling plants were encountered in 1982 or 1998, and an increasing proportion of the population is decadent (35% to 46%). Density has also declined from 5,133 to 4,680 plants/acre since 1982. Utilization was moderate in 1982, but since then it has mostly been classified as light in 1998. Dead plants, first included in 1998, are numerous at 1,340 plants/acre.

Broom snakeweed was numerous in 1982 at 3,933 plants/acre. It has since declined by 92%, density is only 320 plants/acre. The only other fairly common shrub is narrowleaf low rabbitbrush which had a density of 533 plants/acre in 1982, declining to 300 plants/acre by 1998. Pinyon and juniper trees are scattered throughout the site. Point quarter data estimates 83 singleleaf pinyon and 51 Utah juniper trees/acre. Average basal diameter is 3 inches for pinyon and 4.4 inches for juniper. Overhead canopy cover of pinyon on the site averages 7%. This amount of cover would mean that production of the understory could be decreased by as much as 30% to 40%.

The herbaceous understory is poor with cheatgrass providing 57% of the grass cover, and 55% of the total herbaceous cover in 1998. The only common perennial grass is *Galleta*. Perennial forbs are rare with only one species, longleaf phlox, encountered in 1982. During the 1998 reading, 3 annual and 4 perennial forbs were found, but these produce less than 1% cover. The only common species is the annual wooly plantain.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is declining. Erosion is rapid and no stabilization is apparent. Vegetational trend is also down. The key browse species has generally poor vigor, moderate to high hedging levels, and a disturbing level of decadence in the population. Undesirable increaser shrubs are currently abundant, although they do not appear to be rapidly increasing. Annual grasses are the dominant understory component. Finally, singleleaf pinyon and Utah juniper are both increasing. Relatively few plants were encountered on the density plots but a large number of seedling and young were observed in the general area.

### 1998 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has declined slightly, but rock and pavement cover combined has increased from 46% to 50%. There is little bare ground exposed and erosion does not appear to be a serious problem. Trend for browse is down for Wyoming big sagebrush. Density has declined slightly, percent decadence has increased from 35% to 46%, and reproduction is non-existent. In addition, 21% of the

decadent plants are classified as dying. Trend for the herbaceous understory is stable, but poor. Sum of quadrat frequencies of perennial grasses and forbs has remained similar. Cheatgrass, an annual, is the most abundant grass and dominates the herbaceous component. Unfortunately, annuals were not included in past readings so no comparisons can be made.

#### TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - stable, but in poor condition

#### HERBACEOUS TRENDS --

Herd unit 30 , Study no: 53

Type	Species	Nested Frequency '08	Quadrat Frequency		Average Cover % '08
			'82	'98	
G	Bromus tectorum (a)	341	-	100	7.13
G	Hilaria jamesii	163	47	66	4.94
G	Muhlenbergia montana	3	-	1	.03
G	Oryzopsis hymenoides	-	3	-	-
G	Poa secunda	-	-	-	.00
G	Sitanion hystrix	26	27	15	.26
G	Vulpia octoflora (a)	21	-	13	.06
Total for Annual Grasses		362	0	113	7.19
Total for Perennial Grasses		192	77	82	5.23
Total for Grasses		554	77	195	12.43
F	Agoseris glauca	1	-	1	.00
F	Astragalus spp.	2	-	1	.00
F	Draba spp. (a)	13	-	7	.03
F	Eriogonum cernuum (a)	1	-	1	.00
F	Erigeron spp.	1	33	1	.03
F	Phlox longifolia	6	1	3	.01
F	Plantago patagonica (a)	81	-	34	.49
Total for Annual Forbs		95	0	42	0.53
Total for Perennial Forbs		10	34	6	0.05
Total for Forbs		105	34	48	0.58

## BROWSE TRENDS --

Herd unit 30 , Study no: 53

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	92	16.92
B	<i>Chrysothamnus nauseosus</i>	0	-
B	<i>Chrysothamnus viscidiflorus</i> <i>stenophyllus</i>	13	.18
B	<i>Echinocereus</i> spp.	1	.04
B	<i>Gutierrezia sarothrae</i>	11	.06
B	<i>Juniperus osteosperma</i>	1	.06
B	<i>Leptodactylon pungens</i>	0	-
B	<i>Pinus monophylla</i>	8	9.33
Total for Browse		126	26.60

## CANOPY COVER --

Herd unit 30 , Study no: 53

Species	Percent Cover '98
<i>Pinus monophylla</i>	7

## BASIC COVER --

Herd unit 30 , Study no: 53

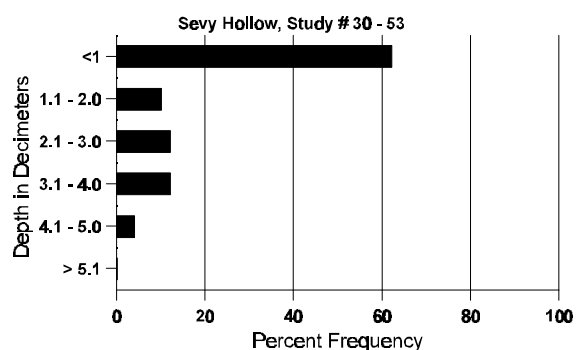
Cover Type	Nested Frequency '98	Average Cover % '82 '98	
Vegetation	348	1.75	39.05
Rock	319	19.50	31.10
Pavement	298	26.00	19.30
Litter	383	38.25	37.24
Cryptogams	144	8.25	1.75
Bare Ground	185	6.25	4.38

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 53, Study Name: Sevy Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
21.8	47.7 (17.7)	5.3	72.0	13.4	14.6	2.4	13.9	169.6	.4

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 53

Type	Quadrat Frequency '98
Rabbit	8
Horse	1
Deer	5
Cattle	1

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 53

Total Acre 55; Study No. 55																			
A Y G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Artemisia tridentata wyomingensis																			
M	82	6	44	-	-	-	-	-	-	-	50	-	-	-	3333	17	22	50	
	98	103	18	2	4	-	-	-	-	-	127	-	-	-	2540	17	25	127	
D	82	-	27	-	-	-	-	-	-	-	11	2	14	-	1800			27	
	98	93	12	-	2	-	-	-	-	-	85	-	-	22	2140			107	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1340			67	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'82		92%				00%				18%				- 9%					
'98		13%				.85%				09%									
Total Plants/Acre (excluding Dead & Seedlings)														'82	5133	Dec:	35%		
														'98	4680		46%		
Chrysothamnus nauseosus																			
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	27	0	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'82		00%				00%				00%									
'98		00%				00%				00%									
Total Plants/Acre (excluding Dead & Seedlings)														'82	0	Dec:	-		
														'98	0				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus stenophyllus																		
M	82	7	1	-	-	-	-	-	-	-	8	-	-	-	533	11	13	8
	98	8	-	-	1	-	-	-	-	-	9	-	-	-	180	7	12	9
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	7	-	-	-	-	-	-	-	-	1	-	-	6	140			7
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		13%			00%			00%			-40%							
'98		00%			00%			38%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	533	Dec:	0%	
														'98	320		44%	
Echinocereus spp.																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	5	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	0	Dec:	-	
														'98	20		-	
Gutierrezia sarothrae																		
Y	82	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	82	57	-	-	-	-	-	-	-	-	57	-	-	-	3800	8	8	57
	98	14	-	-	-	-	-	-	-	-	14	-	-	-	280	5	7	14
D	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-92%							
'98		00%			00%			06%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	3933	Dec:	0%	
														'98	320		13%	
Juniperus osteosperma																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	69	28	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%			-70%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'82	66	Dec:	-	
														'98	20		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Leptodactylon pungens																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	11	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			00%							
		'98			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'98	0		-			
Pinus monophylla																		
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	6	-	-	1	-	-	-	-	-	6	-	-	1	140			7
M	82	1	-	-	-	-	-	-	-	-	1	-	-	-	66	51	45	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'82			00%			00%			+59%							
		'98			00%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	66	Dec:	-			
												'98	160		-			

Trend Study 30-54-98

Study site name: Bullion Canyon.

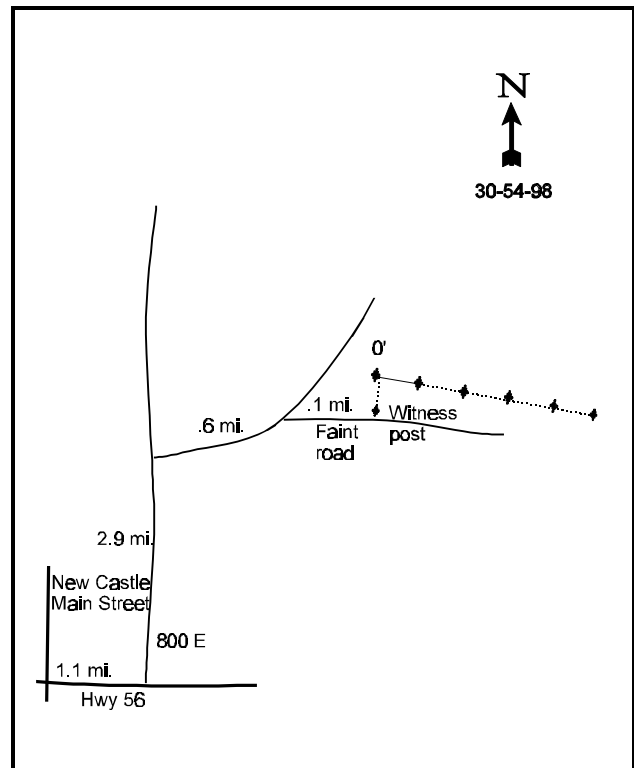
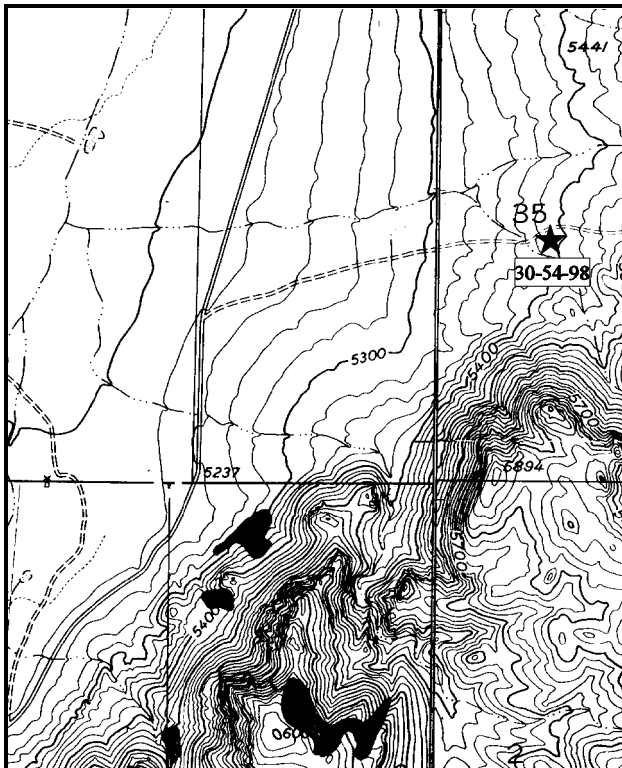
Range type: Wyoming Sagebrush.

Compass bearing : frequency baseline 97 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Starting at the intersection of Hwy 56 and Main street in New Castle, head east on Hwy 56 1.1 miles to 800 E. Turn left (north) onto 800 and drove 2.9 miles to a right turn (.3 miles past a gate). Go 0.6 miles to a fork. Take the faint road to the right and go 0.1 miles to a witness post on the left side of the road. The 0-foot stake is 37 degrees magnetic from the witness post.



Map name: Silver Peak

Diagrammatic Sketch

Township 35S , Range 15W, Section 35

UTM 4176790.416 N, 280124.502 E

## DISCUSSION

### Trend Study No. 30-54

The Bullion Canyon trend study is near the mouth of Bullion Canyon. It was established in 1998 and samples a sagebrush-grass range type within a scattered population of juniper trees. Slope varies from 5% to 10% near the bottom of the hill, to 25% at the end of the baseline. Aspect is to the west and elevation is approximately 5,400 feet. Agricultural fields are located in the valley bottom about 1½ miles to the west. Pellet group data from 1998 estimate moderate deer use at 23 deer days use/acre. Some of the deer pellet groups were recent and bedding sites were present under several highlined juniper trees. A few old cattle pats were also encountered along with some horse sign.

Soil on the site is moderately deep with an effective rooting depth (see methods) estimated at 19 inches. Rock and gravel are abundant on the surface and within the profile. Soil texture is a loam with a neutral pH (7.0). Phosphorus may be limiting to plant growth at 6.4 ppm, when 10 ppm is considered a minimum value for normal plant development. Protective ground cover consists mostly of rock and pavement cover and sagebrush crowns. Litter cover is lacking and percent bare ground is relatively high at 20%. There are some active gullies in the area. The upper hillside is terraced with some localized erosion occurring, but it does not appear to be excessive.

The key browse species consist of a combination of black sagebrush and Wyoming big sagebrush. These species appear to be hybridizing, with many shrubs displaying phenotypes of both black and Wyoming big sagebrush. Wyoming big sagebrush is more numerous at a density of 6,240 plants/acre, which provide 74% of the shrub cover on the site. These plants display moderate to heavy use, mostly good vigor, and low percent decadence at 17%. Black sagebrush has a density of only 180 plants/acre. Use is light to moderate. Reproduction of sagebrush appears adequate to maintain the population.

Other preferred species found on the site in small numbers include: fourwing saltbush, green ephedra, and rubber rabbitbrush. Fourwing is scattered over the site, although it occurs in a dense patch near the baseline. Use is moderate and vigor poor on 1/3 of the plants sampled. Percent decadence is also high at 43%. The green ephedra shows heavy use with a percent decadence of 34%. Ninety percent (180 plants/acre) of the decadent plants were classified as dying.

Increaser shrubs include narrowleaf low rabbitbrush and broom snakeweed. Snakeweed is the most abundant increaser with an estimated density of 1,360 plants/acre. Age class distribution indicates a slightly expanding population. Singleleaf pinyon and Utah juniper trees are scattered over the site. Point quarter data estimates 21 pinyon and 96 juniper trees/acre. Average basal diameter is 1.6 inches for pinyon and 1.9 inches for juniper. Many of the larger, older trees appear highlined.

The herbaceous understory is poor. Grasses are dominated by the annual cheatgrass which provides 72% of the herbaceous cover. Perennial species are rare with only the warm season grass galleta occurring more that occasionally. Forbs are diverse, but the 16 annual and perennial species encountered produce less than 1% cover. The most common species is longleaf phlox.

### 1998 APPARENT TREND ASSESSMENT

The soil trend appears stable but in poor condition. There is a considerable amount of protective ground cover, although most of this comes from rock and pavement. The presence of this type of ground cover can accelerate runoff on moderate slopes. The site is terraced and erosion currently appears localized. Trend for browse appears to be slightly downward for the key species, Wyoming big sagebrush, which makes up 74% of the browse cover. Use is moderate and reproduction does not appear to be adequate to maintain the population as indicated by the percent dead in the population and those decadent plants classified as dying.

The more preferred, but less abundant fourwing saltbush and green ephedra appear to be declining due to heavy use and poor reproduction. The herbaceous understory is poor with cheatgrass providing almost three-fourths of the herbaceous cover. Several desirable perennial grasses are present, but in small numbers. The forb composition is very diverse for this type of site, although all species are rare. The herbaceous trend will likely not improve in the future due to the dominance of cheatgrass, combined with the extreme rockiness of the soil surface. Pavement and rock are dark in color which can greatly elevate soil surface temperatures and decrease soil moisture during the summer.

#### HERBACEOUS TRENDS --

Herd unit 30 , Study no: 54

T y p e	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	<i>Aristida purpurea</i>	1	1	.03
G	<i>Bromus tectorum</i> (a)	404	94	12.57
G	<i>Carex</i> spp.	1	1	.00
G	<i>Hilaria jamesii</i>	112	43	2.07
G	<i>Oryzopsis hymenoides</i>	46	20	.95
G	<i>Poa secunda</i>	22	10	.46
G	<i>Sitanion hystrix</i>	40	21	.38
G	<i>Vulpia octoflora</i> (a)	2	1	.00
Total for Annual Grasses		406	95	12.57
Total for Perennial Grasses		222	96	3.91
Total for Grasses		628	191	16.48
F	<i>Allium</i> spp.	2	1	.00
F	<i>Arabis</i> spp.	4	1	.00
F	<i>Astragalus</i> spp.	5	3	.01
F	<i>Castilleja chromosa</i>	8	4	.09
F	<i>Calochortus nuttallii</i>	5	2	.01
F	<i>Cirsium</i> spp.	8	3	.04
F	<i>Cryptantha</i> spp.	15	7	.03
F	<i>Cymopterus</i> spp.	17	9	.07
F	<i>Descurainia pinnata</i> (a)	13	7	.06
F	<i>Draba</i> spp. (a)	24	12	.11
F	<i>Eriogonum</i> spp.	8	2	.06
F	<i>Gilia</i> spp. (a)	10	7	.06
F	<i>Penstemon</i> spp.	2	2	.01
F	<i>Phlox longifolia</i>	48	22	.23
F	<i>Senecio multilobatus</i>	1	1	.03
F	<i>Streptanthus cordatus</i>	9	5	.07
Total for Annual Forbs		47	26	0.23

T y p e	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
	Total for Perennial Forbs	132	62	0.68
	Total for Forbs	179	88	0.91

# BROWSE TRENDS --

Herd unit 30 , Study no: 54

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	10	1.87
B	Artemisia tridentata wyomingensis	88	17.67
B	Atriplex canescens	6	.97
B	Chrysothamnus nauseosus	0	-
B	Chrysothamnus viscidiflorus stenophyllus	32	.98
B	Echinocereus spp.	3	-
B	Ephedra viridis	7	.45
B	Gutierrezia sarothrae	18	.49
B	Juniperus osteosperma	7	1.44
B	Opuntia spp.	4	-
B	Sclerocactus	1	-
	Total for Browse	176	23.89

# CANOPY COVER --

Herd unit 30 , Study no: 54

Species	Percent Cover '98
Abies concolor	1
Juniperus osteosperma	2

# BASIC COVER --

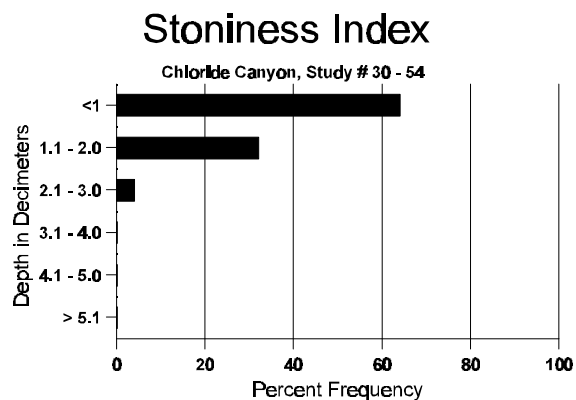
Herd unit 30 , Study no: 54

Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	433	33.48
Rock	340	14.30
Pavement	452	33.29
Litter	437	12.42
Cryptogams	56	.63
Bare Ground	393	20.05

# SOIL ANALYSIS DATA --

Herd Unit 30, Study # 54, Study Name: Chloride Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.0	45.6 (18.3)	7.0	46.0	29.4	24.6	1.7	6.4	160.0	.6



## PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 54

Type	Quadrat Frequency '98
Rabbit	9
Deer	24

## BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 54

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia nova																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	98	14	7	-	-	-	-	-	-	-	20	-	1	-	420	8	15	21
D	98	4	-	-	-	-	-	-	-	-	1	-	-	3	80		4	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing '98		<u>Moderate Use</u> 26%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 15%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	540	Dec:	15%	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata wyomingensis																		
S	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	98	26	14	1	-	-	-	-	-	-	41	-	-	-	820		41	
M	98	35	147	19	1	-	-	-	-	-	202	-	-	-	4040	14	25	
D	98	17	26	8	-	-	-	-	-	-	23	-	-	28	1020		51	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26	
% Plants Showing '98		<u>Moderate Use</u> 64%					<u>Heavy Use</u> 10%			<u>Poor Vigor</u> 10%				<u>%Change</u>				
Total Plants/Acre (excluding Dead & Seedlings)														'98	5880	Dec:	17%	
Atriplex canescens																		
M	98	-	2	-	-	2	-	-	-	-	4	-	-	-	80	21	27	
D	98	1	1	-	-	1	-	-	-	-	1	-	-	2	60		3	
% Plants Showing '98		<u>Moderate Use</u> 86%					<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 29%				<u>%Change</u>				
Total Plants/Acre (excluding Dead & Seedlings)														'98	140	Dec:	43%	
Chrysothamnus nauseosus																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	18	
% Plants Showing '98		<u>Moderate Use</u> 00%					<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%				<u>%Change</u>				
Total Plants/Acre (excluding Dead & Seedlings)														'98	0	Dec:	-	
Chrysothamnus viscidiflorus stenophyllus																		
S	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	98	36	1	-	3	-	-	1	-	-	40	-	-	1	820	10	13	
D	98	4	-	-	-	-	-	-	-	-	2	-	-	2	80		4	
% Plants Showing '98		<u>Moderate Use</u> 02%					<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 06%				<u>%Change</u>				
Total Plants/Acre (excluding Dead & Seedlings)														'98	960	Dec:	8%	
Echinocereus spp.																		
M	98	2	-	-	-	-	-	1	-	-	3	-	-	-	60	3	3	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%					<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%				<u>%Change</u>				
Total Plants/Acre (excluding Dead & Seedlings)														'98	60	Dec:		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ephedra viridis																		
Y	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	98	1	2	15	-	-	-	-	-	-	18	-	-	-	360	16	16	
D	98	-	1	9	-	-	-	-	-	-	1	-	-	9	200		10	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 14%			<u>Heavy Use</u> 83%			<u>Poor Vigor</u> 31%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	580	Dec:	34%	
Gutierrezia sarothrae																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
M	98	46	-	-	-	-	-	-	-	-	46	-	-	-	920	6	6	
D	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 01%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	1360	Dec:	1%	
Juniperus osteosperma																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	140	Dec:	-	
Opuntia spp.																		
M	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	7	
D	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	80	Dec:	50%	
Sclerocactus																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	20	Dec:	-	

Trend Study 30-55-98

Study site name: Quichapa Canyon

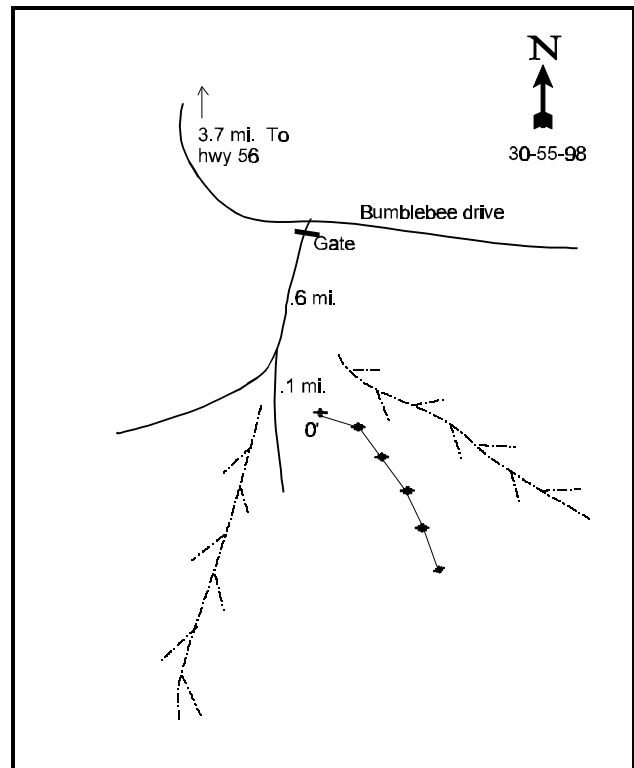
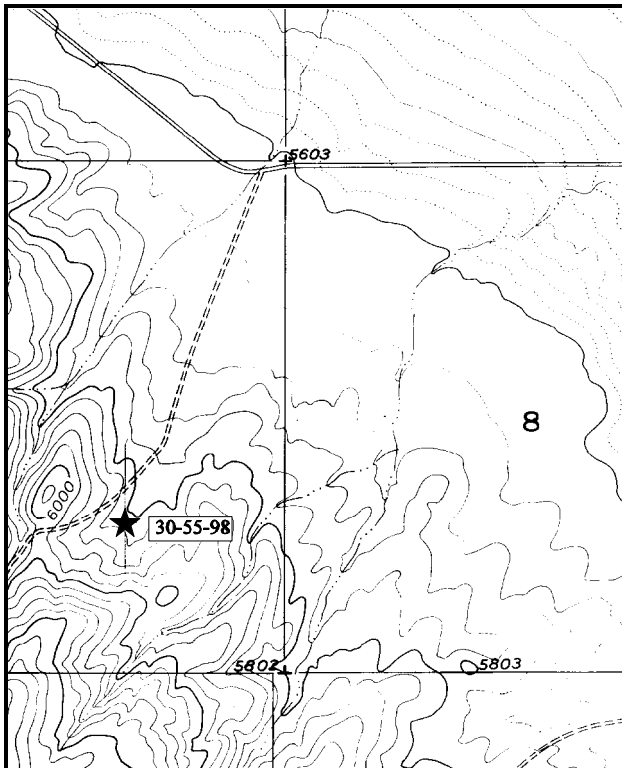
Range type: Mountain Brush .

Compass bearing: frequency baseline 103 M degrees. Lines 2-3 142 °M, line 4 156°M, line 5 153°M.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Take exit 51 and follow the Road west 4.1 miles to a left turn. Take this turn and go through the gate. Travel .6 miles to a fork. Take the left fork for 0.1 miles to a witness post on the left side of the road. The 0-foot stake is 5 paces away at 77° magnetic. The study is marked by half high fenceposts. The 0-foot stake has browse tag # 498 attached.



Map name: Kannarraville

Diagrammatic Sketch

Township 37S , Range 12W , Section 7

UTM 4162671.532 N, 302366.051 E

## DISCUSSION

### Trend Study No. 30-55

The Quichapa Canyon site is a new trend study established in 1998 to monitor deer winter range on the northeast side of unit 30. The study samples a northwest facing ridge at an elevation of about 5,800 feet with a slope of 28%. The site is a mountain brush type with a juniper overstory. Water is available about 1/4 of a mile to the northeast in a stream. The area receives use by deer, sheep, and some cattle. Pellet group data taken from the site in 1998 estimate 41 deer days use/acre. Several deer were seen near the site during study establishment and fresh pellet groups were also observed. Sheep have also recently used the site this year and a sheep camp is located 1/2 mile to the northeast. Some cow sign was also observed in low numbers.

Soil at the site is relatively shallow with an effective rooting depth (see methods) of just over 14 inches. It has a sandy loam type texture on the surface with clay concentrated in lower horizons. Rock and pavement is common on the surface and within the profile. Erosion appears to be occurring due to poor protective ground cover combined with the steep terrain.

Utah juniper is abundant on the site with smaller numbers of pinyon pine. Point quarter data estimate 163 juniper and 23 pinyon trees/acre. Average basal diameter is 6.4 inches for juniper and 7.2 inches for pinyon. These trees provide 37% of the browse cover. Key understory species consist of Utah serviceberry, mountain big sagebrush, and antelope bitterbrush. Serviceberry accounts for 26% of the browse cover with an estimated population of 1,240 plants/acre. Mature plants average nearly 4 feet in height. They are heavily utilized with 44% of the population consisting of decadent plants. Reproduction is good, but 59% (320 plants/acre) of the decadent serviceberry were classified as dying. Currently, there are not enough young plants to replace them.

Mountain big sagebrush provides 30% of the shrub cover with an estimated density of 2,180 plants/acre. Use of the sagebrush is mostly light to moderate. Vigor is normal on most plants and percent decadence is at 25%. Bitterbrush occurs in small numbers of about 300 plants/acre. It displays extreme hedging with most individuals sampled being classified as unavailable due to hedging. There is no sign of reproduction, although vigor is normal on most plants and percent decadency is only 13%. There are also small numbers of black sagebrush, true mountain mahogany, and Gambel oak which provide some additional forage.

The herbaceous understory is very poor. Cheatgrass is the only common herbaceous species. It provides 72% of the grass cover and 66% of the total herbaceous cover. Bottlebrush squirreltail is the only common perennial grass on the site with several other perennial species occurring less frequently. Forbs are diverse with 19 species encountered. However, none are very abundant with all of these forbs combining to produce less than 1% cover. The most abundant species are small annuals.

### 1998 APPARENT TREND ASSESSMENT

The soil is in poor condition with inadequate protective ground cover and abundant bare soil exposed. Erosion is occurring which further degrades the site potential. This trend will continue unless more herbaceous vegetation becomes established. Trend for browse appears to be going down due to extremely heavy use, poor vigor, high decadence, and poor reproduction for most preferred species. In addition, juniper and to a lesser extent pinyon appear to be increasing which will further reduce the shrub and herbaceous understory. The herbaceous understory is poor with most of the grass cover composed of cheatgrass. Perennial species are present but in small numbers. The forb component is very diverse but depleted.

HERBACEOUS TRENDS --  
Herd unit 30 , Study no: 55

T y p e	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Bromus tectorum (a)	371	96	7.05
G	Oryzopsis hymenoides	8	4	.21
G	Poa bulbosa	2	1	.00
G	Poa fendleriana	31	15	.68
G	Poa secunda	3	1	.03
G	Sitanion hystrix	79	33	1.86
G	Vulpia octoflora (a)	4	2	.01
Total for Annual Grasses		375	98	7.06
Total for Perennial Grasses		123	54	2.80
Total for Grasses		498	152	9.86
F	Agoseris glauca	6	2	.01
F	Allium spp.	2	1	.00
F	Astragalus convallarius	2	1	.15
F	Astragalus spp.	8	5	.02
F	Castilleja chromosa	3	1	.00
F	Calochortus nuttallii	4	3	.01
F	Chaenactis douglasii	9	4	.02
F	Collinsia parviflora (a)	61	25	.15
F	Cymopterus spp.	-	-	.00
F	Descurainia pinnata (a)	3	2	.01
F	Draba spp. (a)	13	6	.03
F	Lomatium spp.	3	1	.00
F	Microsteris gracilis (a)	73	35	.17
F	Orobancha fasciculata	2	1	.00
F	Penstemon spp.	2	1	.00
F	Phlox longifolia	19	10	.05
F	Stellaria jamesiana	1	1	.03
F	Trifolium spp.	18	7	.03
F	Zigadenus paniculatus	3	1	.03
Total for Annual Forbs		150	68	0.36
Total for Perennial Forbs		82	39	0.39
Total for Forbs		232	107	0.76

## BROWSE TRENDS --

Herd unit 30 , Study no: 55

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	37	5.16
B	Artemisia nova	0	-
B	Artemisia tridentata vaseyana	69	5.85
B	Cercocarpus montanus	0	-
B	Juniperus osteosperma	8	7.06
B	Opuntia spp.	1	-
B	Pinus edulis	2	.15
B	Purshia tridentata	11	1.41
B	Quercus gambelii	5	.03
Total for Browse		133	19.68

## CANOPY COVER --

Herd unit 30 , Study no: 55

Species	Percent Cover '98
Juniperus osteosperma	10
Quercus gambelii	1

## BASIC COVER --

Herd unit 30 , Study no: 55

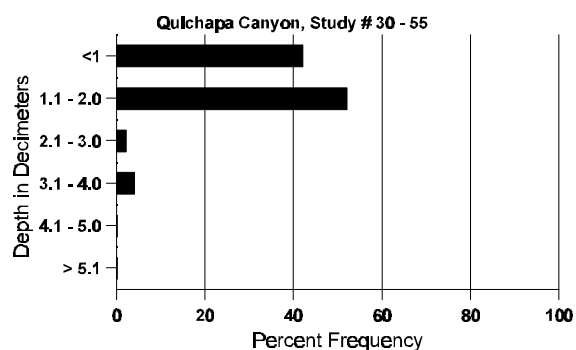
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	398	30.07
Rock	302	11.87
Pavement	352	17.17
Litter	475	39.04
Cryptogams	10	.22
Bare Ground	343	27.82

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 55, Study Name: Quichapa Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.3	54.8 (14.2)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 55

Type	Quadrat Frequency '98
Sheep	2
Rabbit	30
Deer	35

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 55

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
S	98	1	-	-	16	-	-	1	2	-	20	-	-	-	400		20	
Y	98	1	3	-	7	-	-	2	-	-	13	-	-	-	260		13	
M	98	-	3	6	1	1	5	1	-	5	22	-	-	-	440	45 42	22	
D	98	1	3	7	-	7	8	-	-	1	11	-	-	16	540		27	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% Plants Showing '98		<u>Moderate Use</u> 27%			<u>Heavy Use</u> 52%			<u>Poor Vigor</u> 26%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	1240	Dec:	44%	
Artemisia nova																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8 17	0	
D	98	4	-	-	-	-	-	-	-	-	1	-	-	3	80		4	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 75%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	80	Dec:	100%	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	98	7	1	-	4	-	-	-	-	-	12	-	-	-	240		12	
M	98	55	11	-	2	2	-	-	-	-	70	-	-	-	1400	21 28	70	
D	98	17	4	-	-	-	1	1	-	-	17	-	-	6	460		23	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
% Plants Showing '98		<u>Moderate Use</u> 17%			<u>Heavy Use</u> .95%			<u>Poor Vigor</u> 06%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	2100	Dec:	22%			
Cercocarpus montanus																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	44 52	0	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	0	Dec:	-			
Juniperus osteosperma																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	2	-	-	2	-	-	1	-	-	5	-	-	-	100		5	
M	98	2	-	-	-	-	-	-	1	-	3	-	-	-	60	-	3	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	160	Dec:	-			
Opuntia spp.																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6 12	1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	20	Dec:	-			
Pinus edulis																		
S	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	60	Dec:	-			
Purshia tridentata																		
M	98	-	-	-	-	-	3	-	1	9	13	-	-	-	260	20 34	13	
D	98	-	-	-	-	-	-	-	-	2	-	-	-	2	40		2	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 93%			<u>Poor Vigor</u> 13%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'98	300	Dec:	13%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	-	-	-	2	-	-	-	4	-	6	-	-	-	120		6	
M	98	1	-	-	-	-	1	-	-	-	1	-	1	-	40	31	30	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'98		00%			13%			13%										
Total Plants/Acre (excluding Dead & Seedlings)												'98	160	Dec:	-			

Trend Study 30-56-98

Study site name: Woolsey Reseed .

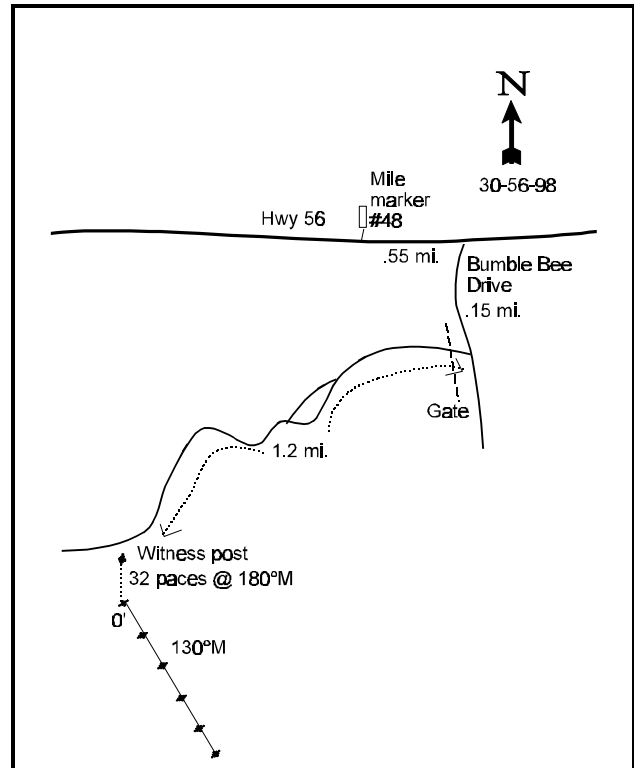
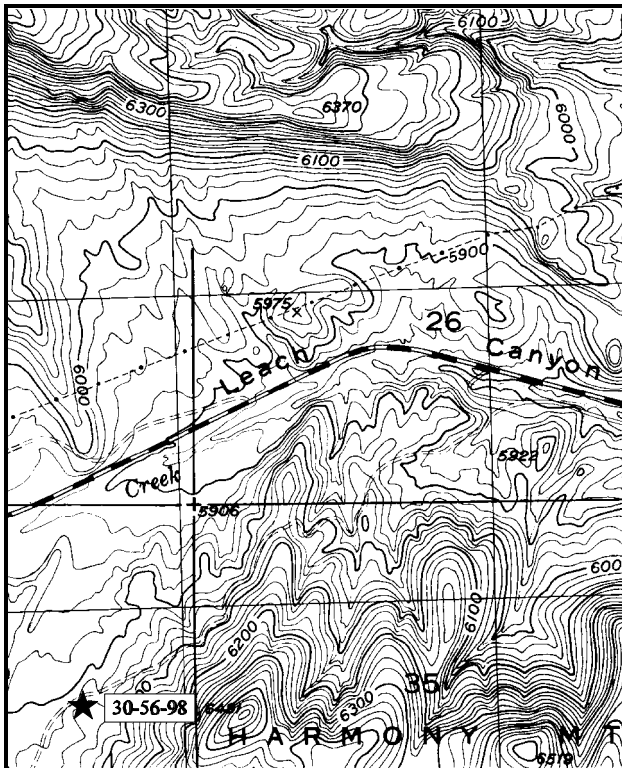
Range type: Chained, Reseeded P-J .

Compass bearing: frequency baseline 130 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From mile marker 48 on Highway 56 go east 0.55 miles to Bumblebee drive. Turn right (south) and travel 0.15 miles crossing a bridge to a right turn. Take this turn and go thru a gate and proceed 1.2 miles to a witness post in a chaining. From the witness post the 0-foot stake is 32 paces directly south. The )-foot stake has browse tag # 95 attached.



Map Name: Desert Mound

Diagrammatic Sketch

Township 36S , Range 13W , Section 34

UTM 4166684.374 N, 297670.511 E

## DISCUSSION

### Trend Study No. 30-56

The Woolsey Seeding is a new trend study established in 1998 located on the Woolsey reseed. It samples a chained and seeded pinyon and juniper site that is considered important deer winter range. The site has an aspect to the west-northwest and a slope from 10% to 15%. Elevation is approximately 5,740 feet. The land is administered by the BLM. Deer are thought to concentrate on the chaining during the winter and cattle also graze the area during the spring and summer. Pellet group data from the site estimate 37 deer and 55 cow days use/acre. Escape cover for deer is abundant in the form of large serviceberry and unchained pinyon and juniper trees about 500 feet to the east.

Soil on the site is moderately deep and rocky on the surface and through the profile. Effective rooting depth (see methods) is estimated at 16 inches. Soil texture is a clay loam with a neutral pH (7.0). Phosphorus may be limiting to plant growth with only 6.1 ppm found in the soil sample, when 10 ppm is considered a minimum value for normal plant development. Erosion is not a problem on the site due to the abundant protective ground cover consisting primarily of herbaceous vegetation and old chaining litter.

The site supports low densities of Utah serviceberry, dwarf rabbitbrush, Parry rabbitbrush, cliffrose, and antelope bitterbrush. Most of these were not adequately sampled because they occur in such limited numbers. Cliffrose and bitterbrush are heavily hedged with serviceberry moderately utilized. Some of the true mountain mahogany and curleaf mountain mahogany are also heavily hedged. Juniper trees have been released by the chaining. Young trees in the 4 to 6 foot class are fairly abundant. Point quarter data estimate there are 59 Utah juniper and 28 singleleaf pinyon trees/acre. Average basal diameter is 2 inches for each species. Pinyon and juniper provide nearly 4% cover which accounts for 53% of the shrub cover. Overhead canopy cover is almost 3% for juniper and pinyon.

Seeded grasses dominate the site. Crested wheatgrass, intermediate wheatgrass, and Russian wildrye are abundant and provide 96% of the grass cover, or 93% of the herbaceous cover. Three native perennial grasses are also present in small numbers as is the annual, cheatgrass. The forb component is diverse with 15 species encountered. However, all species occur rarely and all forbs combined produce only about 1% cover.

### 1998 APPARENT TREND ASSESSMENT

The soil appears stable due to the abundant protective ground cover consisting primarily of perennial herbaceous vegetation and litter from the chaining. There is a variety of browse species on the site, although none are very abundant. The most preferred species are being the most heavily utilized. Trend appears stable, but management strategies to increase the shrub component on the site would be desirable for deer winter range improvement. The herbaceous understory is abundant and well established. However, composition could be better as three seeded grasses dominate and forbs are limited.

## HERBACEOUS TRENDS --

Herd unit 30 , Study no: 56

T y p e	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron cristatum	190	58	8.09
G	Agropyron intermedium	287	76	13.56
G	Bromus tectorum (a)	75	28	.75
G	Elymus junceus	110	43	4.10
G	Oryzopsis hymenoides	-	-	.03
G	Poa secunda	4	2	.01
G	Sitanion hystrix	3	1	.15
Total for Annual Grasses		75	28	0.75
Total for Perennial Grasses		594	180	25.96
Total for Grasses		669	208	26.71
F	Astragalus spp.	5	3	.09
F	Cymopterus spp.	7	4	.09
F	Dalea flavescens	5	2	.30
F	Descurainia pinnata (a)	5	3	.01
F	Draba spp. (a)	11	6	.03
F	Eriogonum umbellatum	3	1	.03
F	Lappula occidentalis (a)	3	2	.01
F	Lesquerella spp.	4	4	.07
F	Lotus utahensis	2	1	.03
F	Lupinus argenteus	3	1	.00
F	Microsteris gracilis (a)	21	10	.05
F	Penstemon spp.	4	1	.00
F	Petradoria pumila	9	2	.18
F	Phlox hoodii	5	3	.04
F	Streptanthus cordatus	2	2	.01
Total for Annual Forbs		40	21	0.10
Total for Perennial Forbs		49	24	0.85
Total for Forbs		89	45	0.96

## BROWSE TRENDS --

Herd unit 30 , Study no: 56

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Amelanchier utahensis	2	.85
B	Artemisia tridentata vaseyana	1	-
B	Cercocarpus montanus	1	-
B	Chrysothamnus depressus	18	.55
B	Chrysothamnus parryi howardi	8	1.56
B	Cowania mexicana stansburiana	0	-
B	Eriogonum microthecum	3	.03
B	Gutierrezia sarothrae	20	.45
B	Juniperus osteosperma	4	1.94
B	Pinus monophylla	3	1.97
B	Purshia tridentata	0	.03
B	Ribes spp.	1	-
Total for Browse		61	7.40

## CANOPY COVER --

Herd unit 30 , Study no: 56

Species	Percent Cover '98
Juniperus osteosperma	.60
Pinus monophylla	2

## BASIC COVER --

Herd unit 30 , Study no: 56

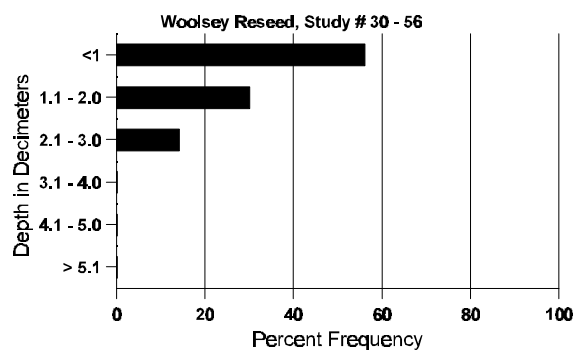
Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	420	39.56
Rock	212	5.94
Pavement	338	9.63
Litter	486	52.22
Cryptogams	20	.24
Bare Ground	326	18.28

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 56, Study Name: Woolsey Reseed

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.1	51.6 (16.3)	7.0	38.0	25.4	36.6	3.5	6.1	118.4	.7

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 56

Type	Quadrat Frequency '98
Rabbit	25
Deer	24
Cattle	11

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 56

A Y G R E	Form Class (No. of Plants)										Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
	1	2	3	4	5	6	7	8	9	1	2	3	4					
Amelanchier utahensis																		
M	98	-	2	-	-	-	-	-	-	-	2	-	-	-	40	37	51	2
% Plants Showing '98		<u>Moderate Use</u> 100%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	40	Dec:	-	
Artemisia tridentata vaseyana																		
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	20	Dec:	-	
Cercocarpus montanus																		
M	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20	50	54	1
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 100%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	20	Dec:	-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus depressus																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	98	25	-	-	1	-	-	-	-	-	26	-	-	-	520	4	6	26
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	620	Dec:					
Chrysothamnus parryi howardi																		
Y	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	98	6	3	-	-	-	-	-	-	-	9	-	-	-	180	34	43	9
D	98	2	2	-	-	-	-	-	-	-	2	-	-	2	80		4	
% Plants Showing '98		<u>Moderate Use</u> 40%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 13%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	300	Dec:	27%				
Cowania mexicana stansburiana																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	62	66	0
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	0	Dec:					
Eriogonum microthecum																		
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	11	2
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	60	Dec:					
Gutierrezia sarothrae																		
S	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	98	56	-	-	-	-	-	-	-	-	56	-	-	-	1120	7	10	56
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	1180	Dec:					

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
S	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	100	Dec:	-				
Pinus monophylla																		
Y	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	98	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	1	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	60	Dec:	-				
Purshia tridentata																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33 70	0	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	0	Dec:	-				
Ribes spp.																		
M	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	4	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'98	80	Dec:	-				

Trend Study 30-57-98

Study site name: Summit Spring .

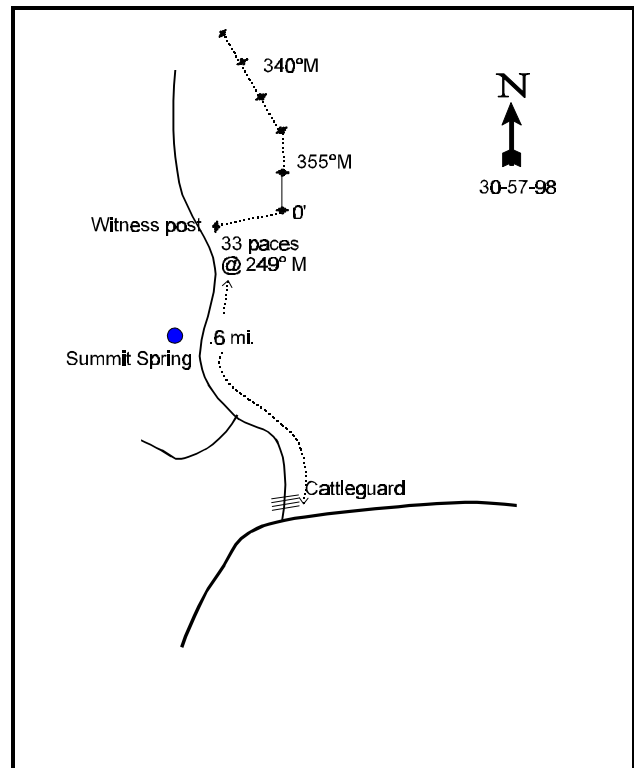
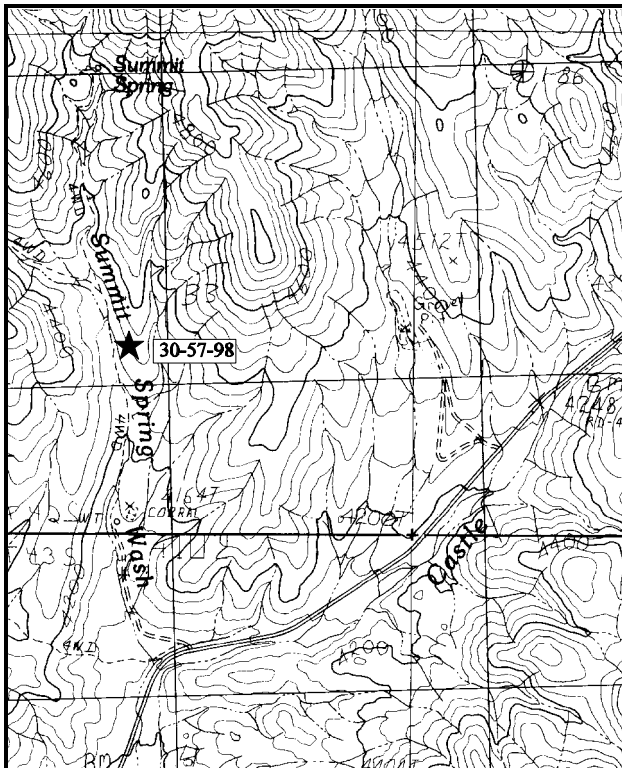
Range type: Desert Shrub .

Compass bearing: frequency baseline 355 M degrees. Lines 3-5 340 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the Lytle Ranch turnoff just south of Castle Cliff, proceed northeast for approximately 1.5 miles to a dirt road on the left (north) that leads to Summit Spring. From the highway, go 0.3 miles to a cattle watering trough and corral. Continue 0.3 miles further to a witness post on the right (east) side of the road. The 0-foot stake is 33 paces from the witness post at a bearing of 249 degrees magnetic. The 0-foot stake has browse tag 494 attached.



Map Name Jarvis Peak

Diagrammatic Sketch

Township 42S , Range 18W , Section 33

UTM 4108116.846 N, 244863.897 E

## DISCUSSION

### Trend Study No. 30-57

The Summit Spring trend study site was established in 1998. The site was placed about ½ mile south of Summit Spring. It samples winter range on the south west side of the unit. The site is placed along a ridge which supports a desert shrub community. Slope is 40% with a west, southwest aspect and an elevation of about 4,100 feet. The area is grazed by cattle, and cattle were present near the site during study site establishment on June 2<sup>nd</sup>. A cattle watering trough, which is apparently fed by a pipe from nearby Summit Spring, is found about 1/4 of a mile to the south. Pellet group data estimate a high level of deer use at 61 days use/acre. Cow use was estimated at 4 day use/acre. Cattle use is higher on the more level areas and along the ridge top.

Soil on the site is relatively shallow and very rocky. Effective rooting depth (see methods) is estimated at nearly 14 inches. Soil texture is a sandy loam with a neutral pH (6.9). Rock and pavement are concentrated on the surface and account for 54% of the ground cover. Some erosion is apparent due to the steep slope.

The site supports 11 shrub species, including the more preferred cliffrose and green ephedra. Blackbrush, slenderbush eriogonum, and desert almond also provide some browse. Cliffrose provides 27% of the browse cover with an estimated density of 220 plants/acre. Mature plants are large, averaging nearly 4 feet in height with a crown diameter of over 5 feet. They display light to moderate use and good vigor. Green ephedra density is approximately 680 plants/acre. They are light to moderately utilized. Other browse species show mostly light use, good vigor, and low decadence.

Undesirable shrubs found on the site include threadleaf snakeweed, Mohave desertrue (turpentine bush), and datil yucca (banana yucca). Snakeweed is the most abundant with a density of 1,720 plants/acre. Age class distribution would indicate a stable population however.

The herbaceous understory is very poor and depleted. Cheatgrass totally dominates the understory providing 99% of the grass cover and 79% of the herbaceous cover. No perennial grasses were encountered on the site, but some Indian ricegrass was observed growing under the protection of shrubs. The forb component is also poor with storksbill providing 99% of the forb cover. Other forbs are rare and only three perennial species were found. Perennial grass and forb cover provide less than 1/4 of 1% cover. The only forage source for deer or cattle would have to come from the shrubs.

### 1998 APPARENT TREND ASSESSMENT

The soil condition is poor. Rock and pavement provides most of the ground cover. Erosion is apparent, yet not severe. Shrubs are diverse and moderately abundant. Preferred species appear stable with light to moderate use, good vigor, and low decadence. However, reproduction is limited on most species. The herbaceous understory is very poor and totally dominated by cheatgrass and storksbill. Perennial species are rare.

HERBACEOUS TRENDS --

Herd unit 30 , Study no: 57

T y p e	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Bromus tectorum (a)	432	99	21.97
G	Oryzopsis hymenoides	-	-	.00
G	Vulpia octoflora (a)	4	1	.00
Total for Annual Grasses		436	100	21.98
Total for Perennial Grasses		0	0	0.00
Total for Grasses		436	100	21.98
F	Aster spp.	6	3	.04
F	Cryptantha spp.	3	1	.00
F	Draba spp. (a)	8	3	.04
F	Erodium cicutarium (a)	164	63	5.59
F	Microsteris gracilis (a)	2	1	.00
F	Plantago patagonica (a)	10	5	.05
F	Salvia columbariae	5	2	.19
Total for Annual Forbs		184	72	5.68
Total for Perennial Forbs		14	6	0.23
Total for Forbs		198	78	5.92

BROWSE TRENDS --

Herd unit 30 , Study no: 57

T y p e	Species	Strip Frequency '98	Average Cover % '98
B	Cowania mexicana stansburiana	8	5.73
B	Coleogyne ramosissima	11	-
B	Echinocereus engelmannii	1	.03
B	Ephedra viridis	17	.65
B	Eriogonum microthecum	0	.03
B	Gutierrezia microrcephala	44	3.47
B	Haplopappus linearifolius	25	4.05
B	Opuntia spp.	1	.00
B	Prunus fasciculata	5	4.85
B	Thamnosma montana	21	.50
B	Yucca baccata baccata	12	2.24
Total for Browse		145	21.59

BASIC COVER --

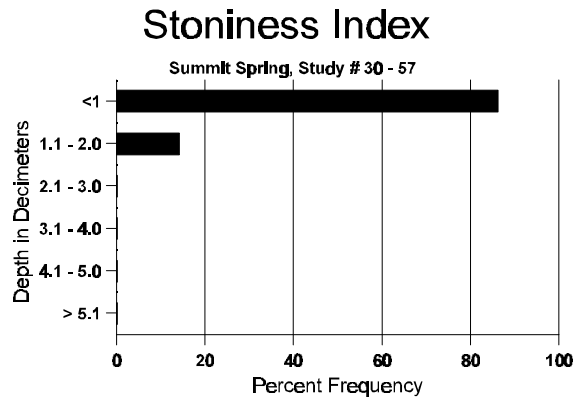
Herd unit 30 , Study no: 57

Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	446	45.40
Rock	279	19.40
Pavement	397	34.65
Litter	454	27.13
Bare Ground	238	6.44

SOIL ANALYSIS DATA --

Herd Unit 30, Study # 57, Study Name: Summit Spring

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.9	64.0 (15.9)	6.9	66.0	21.4	12.6	.7	10.4	83.2	.5



PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 57

Type	Quadrat Frequency '98
Rabbit	5
Deer	28
Cattle	1

## BROWSE CHARACTERISTICS --

Herd unit 30, Study no: 57

A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cowania mexicana stansburiana																		
Y	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	98	6	4	-	-	-	-	-	-	-	10	-	-	-	200	47	64	
% Plants Showing '98		<u>Moderate Use</u> 36%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'98	220	Dec:	-
Coleogyne ramosissima																		
S	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	98	11	1	-	-	-	-	-	-	-	12	-	-	-	240	27	46	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 08%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'98	240	Dec:	-
Echinocereus engelmannii																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	9	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'98	20	Dec:	-
Ephedra viridis																		
Y	98	6	3	-	1	-	-	-	-	-	10	-	-	-	200		10	
M	98	15	6	-	-	-	-	-	-	-	21	-	-	-	420	21	29	
D	98	2	1	-	-	-	-	-	-	-	1	-	-	2	60		3	
% Plants Showing '98		<u>Moderate Use</u> 29%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 06%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'98	680	Dec:	9%
Eriogonum microthecum																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	27	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)															'98	0	Dec:	-

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia microrcephala																		
S	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	98	66	-	-	1	-	-	-	-	-	67	-	-	-	1340	16 19	67	
D	98	12	-	-	1	-	-	-	-	-	3	-	-	10	260		13	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 11%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	1740	Dec:	15%	
Haplopappus linearifolius																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	98	23	-	-	-	-	-	-	-	-	23	-	-	-	460	22 31	23	
D	98	11	-	-	-	-	-	-	-	-	9	-	-	2	220		11	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 05%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	780	Dec:	28%	
Opuntia spp.																		
Y	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11 12	0	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	20	Dec:	-	
Prunus fasciculata																		
S	98	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
M	98	8	1	-	-	-	-	-	-	-	9	-	-	-	180	45 67	9	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 11%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	180	Dec:		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Thamnosma montana																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	98	18	2	-	1	-	-	-	-	-	20	-	1	-	420	16 34	21	
D	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '98		<u>Moderate Use</u> 13%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 04%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	480	Dec:	4%	
Yucca baccata baccata																		
M	98	32	-	-	-	-	-	-	-	-	32	-	-	-	640	31 39	32	
D	98	4	-	-	1	-	-	-	-	-	2	-	-	3	100		5	
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing '98		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 08%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'98	740	Dec:	14%	

Trend Study 30-58-98

Study site name: Spirit Creek South Burned .

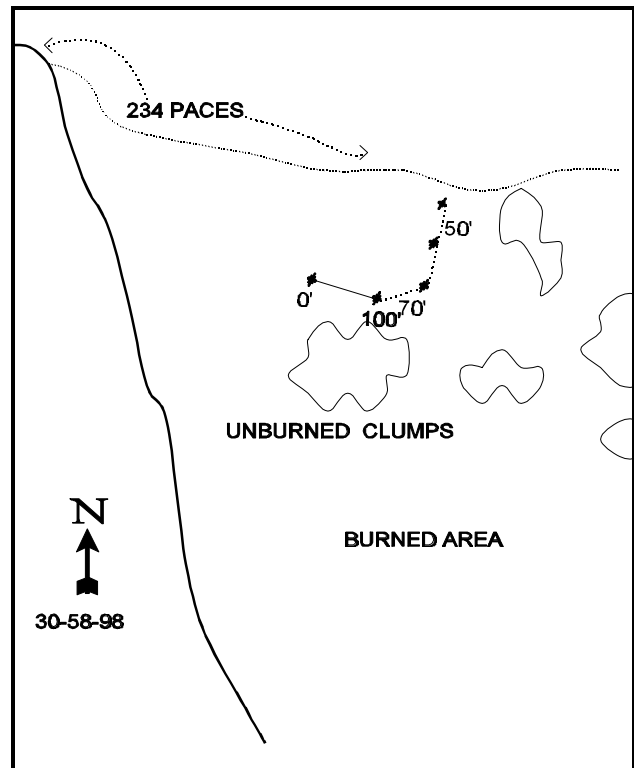
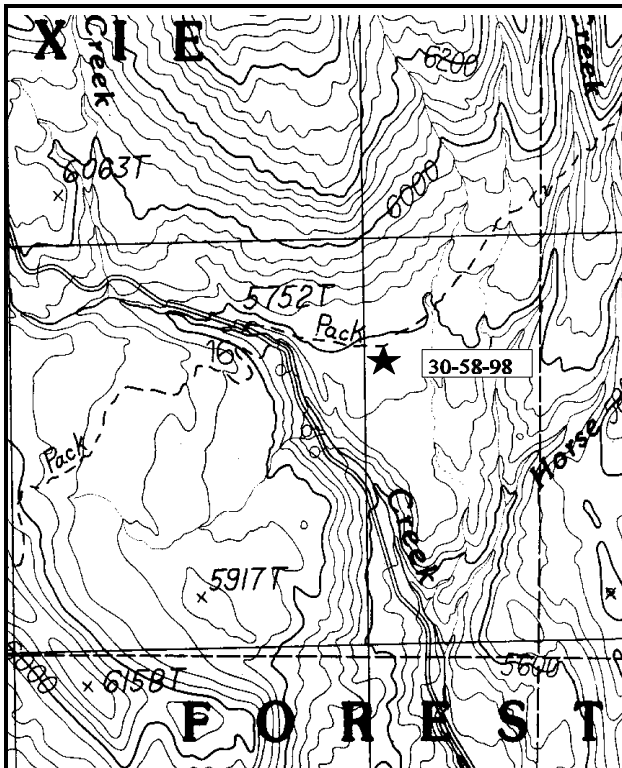
Range type: Burn .

Compass azimuth: frequency baseline 111 M degrees. (Line 2 94°M, line 3 & 4 15°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (34ft).

LOCATION DESCRIPTION

Traveling south on I-15 from Cedar City, take the first Leeds exit. Travel northwest on the Leeds Creek Road for 3.25 miles. Stay to the right at the fork and proceed about 4 miles towards the Oak Grove campground. Stop just past a bridge at the Jones Hollow (Blake-Harmony) trail head. Hike 234 paces up the trail to a 4 foot tall green fence post 75 feet southwest (212°) of the trail. This is the 0-foot baseline stake. All stakes are 4 foot tall green fence posts.



Map Name: Signal Peak

Diagrammatic Sketch

Township 40S , Range 14W , Section 16

UTM 4131707.538 N, 285032.527 E

## DISCUSSION

### Trend Study No. 30-58 (50A-26)

The Spirit Creek South Burn trend site consists of a nearly level grass meadow surrounded by Gambel and shrub-live oak. The site has an elevation of 5,800 feet, slope of 4-5%, and a south to southeast aspect. The site, which was previously a mountain big sagebrush flat, was burned in June 1986, and seeded in early July by the Dixie National Forest. The area is important fawning habitat for mule deer which is evidenced by the abundant pellet groups in 1992. Pellet group data from 1998 also estimate a high level of use at 76 deer days use/acre. Some of the deer pellet groups were fresh when the study was read in 1998 on June 4<sup>th</sup>. No cattle grazing occurs in this area.

Soil is a moderately deep sandy loam with little rock on the surface or within the profile. Effective rooting depth (see methods) is estimated at over 27 inches. The soil has a slightly acid pH (6.1). Due to the flat topography, erosion is not a problem, even with high amounts of bare ground occurring after the fire. The study was established September 16, 1986, about 3 months after the fire. At that time, basal vegetative cover was less than one percent. Bare ground covered 94% of the ground surface, while litter left after the fire, averaged only 6%. The site was read again in September of 1987. Basal vegetative cover increased to 10%, litter increased to 16%, while bare ground declined to 74%. Some soil movement was noticed, yet it was not significant. During the 1992 reading, soil conditions continued to improve. Basal vegetative cover averaged 23%, while bare ground continued to decline significantly. Litter cover rose to 49%. Protective ground cover has continued to improve. By 1998, percent bare ground had declined to 18%, while litter cover increased to 68%.

The site previously was dominated by mountain big sagebrush. Burned sagebrush stumps counted during the 1986 reading indicated a pre-burn density of approximately 7,100 plants/acre. The only browse left on the site in 1986 consisted of re-sprouting Gambel oak which numbered 3,533 stems/acre. By 1987, there were an estimated 433 seedling sagebrush per acre on the site. Desert ceanothus and broom snakeweed seedlings also appeared in small numbers. Oak increased along the frequency base line, but declined to 633 young plants/acre on the density plots. During the 1992 reading, there were an estimated 166 plants/acre of sagebrush, 19% of which were classified as decadent. All other sagebrush consisted of seedlings and young. Gambel oak continued to increase on the frequency belts, but disappeared in the density plots. Broom snakeweed occurred in small numbers. Utilization of browse in all years was light. During the 1998 reading, the original 100 foot frequency baseline was extended another 300 feet in order to better sample the small meadow. Density of sagebrush increased to 340 plants/acre with no seedlings sampled. Young plants were also rare at only 60 plants/acre. Dead sagebrush listed in the table consist of old burned stems. Utilization of the sagebrush is mostly light with some moderate use. Vigor is good on all except decadent sagebrush. Density of Gambel oak increased due to the larger sample where it grows in vigorous scattered clones. Mature plants average nearly 4 feet in height.

The site is currently dominated by seeded grasses and alfalfa. However, during the 1986 reading, no seeded species had established. Bottlebrush squirreltail and mutton grass were the only perennial grasses encountered. Forbs consisted of a few early seral species. By 1987, seeded grasses became well established with crested and intermediate wheatgrass being the most common. Seeded forbs, yellow sweetclover and alfalfa, also became well established along with several invasive weedy species. Crested and intermediate wheatgrass continued to dominate the site in 1992 with quadrat frequencies of 91% and 92% respectively. Smooth brome is also fairly abundant. Two species, orchard and mutton grass, were not encountered in 1992. During the 1998 reading, intermediate wheatgrass was by far the most abundant species. It provided 58% of the grass cover and had a cover value of 23%. Crested wheatgrass and smooth brome were the only other common perennial species. They account for 24% and 11% of the grass cover respectively. Annual cheatgrass was also encountered in 1998. Previous readings did not include annuals in their samples. Currently, cheatgrass provides only 5% of the grass cover, although it has a quadrat frequency of 65%.

Overall, quadrat frequency of forbs have declined since 1987. Seeded forbs have all disappeared with the exception of alfalfa which has increased. During the 1998 reading, alfalfa accounted for 82% of the forb cover. It declined significantly in nested frequency between 1987 and 1992, but has since remained stable. Forb diversity and abundance is likely hindered by the abundance of aggressive exotic grasses seeded onto the site. These grasses will limit future shrub recruitment (Monsen et al. 1995, Walker et al. 1995).

#### 1992 TREND ASSESSMENT

Soil conditions have improved dramatically since the burn. Basal vegetative cover has increased every year, while bare ground has declined. Litter cover has increased from 6% to 49%. Browse are not abundant on the site, but some sagebrush has become re-established and oak has resprouted. Overall, the browse trend is down when compared to the pre-burn conditions, but has improved since the fire. Further improvements in the browse composition may be hindered by the dominance of seeded exotic grasses. The herbaceous understory has improved significantly since the burn. From 1986 to 1987, both grass and forb sum of nested frequencies increased significantly. Sum of nested frequency for crested wheatgrass and intermediate wheatgrass, and smooth brome continued to increase between 1987 and 1992. Other seeded and native grasses declined or disappeared from the site. Forb nested frequencies declined during the same interval. The only common forbs left on the site are a *Euphorbia* sp. and alfalfa. Combined nested frequencies of grasses and forbs have not increased since 1987. Overall, herbaceous understory has improved between 1986 and 1987 and is stable between 1987 and 1992. One area of concern is the lack of forbs on the site which are important for spring and summer forage for deer (Valentine 1990).

##### TREND ASSESSMENT

soil - improved

browse - up, but poor composition, however not important for summer/fawning area

herbaceous understory - stable, but poor forb diversity and abundance

#### 1998 TREND ASSESSMENT

Trend for soil continues to improve with percent bare ground declining from 28% to 18% and litter cover increasing from 49% to 68%. Erosion does not appear to be a problem on this site. Trend for browse appears to be up slightly. Density of mountain big sagebrush has increased and broom snakeweed density has declined 55%. Use of the limited sagebrush is not as heavy as reported in 1992. Trend for the herbaceous understory is mixed. Trend for grasses is up with a significant increase in the nested frequency of intermediate wheatgrass and smooth brome. Sum of nested frequency of forbs has declined slightly. The most abundant forb, alfalfa, has remained stable however. Trend is considered up slightly, yet the forb composition is poor.

##### TREND ASSESSMENT

soil - up

browse - up slightly, but limited in number

herbaceous understory - up slightly, but poor forb diversity and abundance

HERBACEOUS TRENDS --  
Herd unit 30 , Study no: 58

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover % 08
		'86	'87	'92	'98	'86	'87	'92	'98	
G	Agropyron cristatum	-	187	223	203	-	73	91	79	9.51
G	Agropyron intermedium	a-	b163	c268	d299	-	65	92	93	22.76
G	Bromus inermis	a-	b33	b62	c166	-	19	28	69	4.42
G	Bromus tectorum (a)	-	-	-	197	-	-	-	65	1.82
G	Dactylis glomerata	a-	b19	a-	a-	-	10	-	-	-
G	Festuca ovina	a-	b15	a2	a5	-	8	1	2	.18
G	Poa fendleriana	ab2	b14	a-	ab2	1	7	-	1	.15
G	Poa pratensis	-	-	-	-	-	-	-	-	.00
G	Sitanion hystrix	5	10	2	1	3	5	2	1	.03
G	Vulpia octoflora (a)	-	-	-	36	-	-	-	15	.40
Total for Annual Grasses		0	0	0	233	0	0	0	80	2.22
Total for Perennial Grasses		7	441	557	676	4	187	214	245	37.07
Total for Grasses		7	441	557	909	4	187	214	325	39.30
F	Agoseris glauca	a-	a-	b-	9	-	-	-	4	.04
F	Chenopodium spp. (a)	3	-	2	-	1	-	1	-	-
F	Crepis acuminata	-	-	1	-	-	-	1	-	-
F	Cymopterus spp.	-	-	-	5	-	-	-	3	.02
F	Draba spp. (a)	-	-	-	22	-	-	-	9	.09
F	Erigeron spp.	-	-	3	-	-	-	1	-	-
F	Euphorbia spp.	17	16	23	9	7	8	9	3	.06
F	Lotus utahensis	6	12	6	6	3	6	4	3	.33
F	Melilotus officinalis	a-	b24	a-	a-	-	13	-	-	-
F	Medicago sativa	a-	c88	b41	b40	-	45	25	17	7.13
F	Microsteris gracilis (a)	-	-	-	183	-	-	-	76	1.00
F	Nicotiana attenuata (a)	-	39	-	-	-	21	-	-	-
F	Penstemon leonardi	-	2	-	-	-	1	-	-	-
F	Physalis spp.	a-	b5	a-	a-	-	4	-	-	-
F	Sanguisorba minor	-	2	-	-	-	2	-	-	-
F	Sphaeralcea grossulariaefolia	-	3	-	-	-	1	-	-	-
F	Unknown forb-perennial	-	-	6	-	-	-	2	-	-
Total for Annual Forbs		3	39	2	205	1	21	1	85	1.09
Total for Perennial Forbs		23	152	80	69	10	80	42	30	7.59
Total for Forbs		26	191	82	274	11	101	43	115	8.69

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 58

T y p e	Species	Strip Frequency 08	Average Cover % 08
B	Arctostaphylos patula	2	.03
B	Artemisia tridentata vaseyana	13	.45
B	Ceanothus greggii	0	-
B	Eriodictyon angustifolium	0	-
B	Gutierrezia sarothrae	3	.15
B	Opuntia spp.	2	.30
B	Quercus gambelii	27	5.15
B	Quercus turbinella	4	.03
Total for Browse		51	6.11

## CANOPY COVER --

Herd unit 30 , Study no: 58

Species	Percent Cover 08
Quercus gambelii	1

## BASIC COVER --

Herd unit 30 , Study no: 58

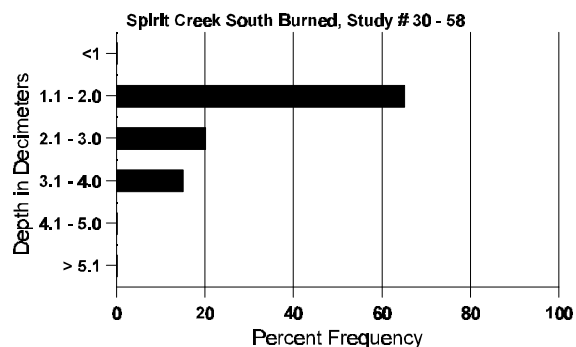
Cover Type	Nested Frequency 08	Average Cover %			
		'86	'87	'92	'98
Vegetation	378	.25	9.75	22.50	55.70
Rock	9	0	0	0	.02
Pavement	72	0	.25	.75	.51
Litter	400	5.50	15.75	48.50	68.34
Cryptogams	60	0	0	0	.46
Bare Ground	214	94.25	74.25	28.25	18.20

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 58, Study Name: Spirit Creek South Burned

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
27.4	42.8 (17.7)	6.1	64.0	21.4	14.6	1.8	15.2	176.0	.7

## Stoniness Index



### PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 58

Type	Quadrat Frequency
	08
Rabbit	1
Deer	55

### BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 58

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Arctostaphylos patula																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	1	1	-	-	-	-	-	-	-	-	2	-	-	-	40	14	19
X	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'86	00%			00%			00%									
		'87	00%			00%			00%									
		'92	00%			00%			00%									
		'98	50%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	0		-			
												'98	40		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches) Ht. Cr.	Total			
		1	2	3	4	5	6	7	8	9				1	2	3
Artemisia tridentata vaseyana																
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	13	-	-	-	-	-	-	-	-	-	-	-	433		13
	92	1	-	-	-	-	-	-	-	-	-	-	-	33		1
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	3	1	-	-	-	-	-	-	-	-	-	-	133		4
	98	3	-	-	-	-	-	-	-	-	-	-	-	60		3
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	7	2	-	1	-	-	-	-	-	-	-	-	200	17	10
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	1	-	-	-	-	-	-	-	-	-	33		1
	98	3	1	-	-	-	-	-	-	-	-	-	3	80		4
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	1880		94
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'86		00%			00%			00%								
'87		00%			00%			00%								
'92		20%			20%			00%			+51%					
'98		18%			00%			18%								
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%	
												'87	0		0%	
												'92	166		20%	
												'98	340		24%	
Ceanothus greggii																
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	4	-	-	-	-	-	-	-	-	-	-	-	133		4
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>					
'86		00%			00%			00%								
'87		00%			00%			00%								
'92		00%			00%			00%								
'98		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-	
												'87	0		-	
												'92	0		-	
												'98	0		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Eriodictyon angustifolium																		
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	13	0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
		'86				00%				00%				00%				
		'87				00%				00%				00%				
		'92				00%				00%				00%				
		'98				00%				00%				00%				
Total Plants/Acre (excluding Dead & Seedlings)												'86		0	Dec:	-		
												'87		0		-		
												'92		0		-		
												'98		0		-		
Gutierrezia sarothrae																		
Y	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	'92	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	'86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'87	10	-	-	-	-	-	-	-	-	9	-	1	-	333	9	7	10
	'92	4	-	-	-	-	-	-	-	-	4	-	-	-	133	10	15	4
	'98	6	-	-	-	-	-	-	-	-	6	-	-	-	120	6	12	6
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
		'86				00%				00%				00%				
		'87				00%				00%				-27%				
		'92				00%				00%				-55%				
		'98				00%				00%				00%				
Total Plants/Acre (excluding Dead & Seedlings)												'86		0	Dec:	-		
												'87		366		-		
												'92		266		-		
												'98		120		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	2	-	-	-	-	-	-	-	-	-	2	-	-	66		2	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	1	-	-	-	-	-	-	-	-	-	-	1	-	33	6	9	
	98	-	2	-	-	-	-	-	-	-	-	-	-	2	40	8	22	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'86		00%				00%				00%								
'87		00%				00%				00%				-50%				
'92		00%				00%				100%				+18%				
'98		100%				00%				100%								
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	66		-			
												'92	33		-			
												'98	40		-			
Quercus gambelii																		
S	86	98	8	-	-	-	-	-	-	-	104	-	2	-	3533		106	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	18	1	-	-	-	-	-	-	-	16	3	-	-	633		19	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	30	-	-	-	-	-	-	-	-	30	-	-	-	600		30	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	44	5	-	13	-	-	-	-	-	62	-	-	-	1240	45	48	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	660		33	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'86		00%				00%				00%								
'87		05%				00%				00%								
'92		00%				00%				00%								
'98		05%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'87	633		0%			
												'92	0		0%			
												'98	2000		8%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus turbinella																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20	50 59	1
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	-	-	-	2	40		2	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			50%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'87	0		0%			
												'92	0		0%			
												'98	80		50%			

Trend Study 30-59-98

Study site name: Upper Horse Creek .

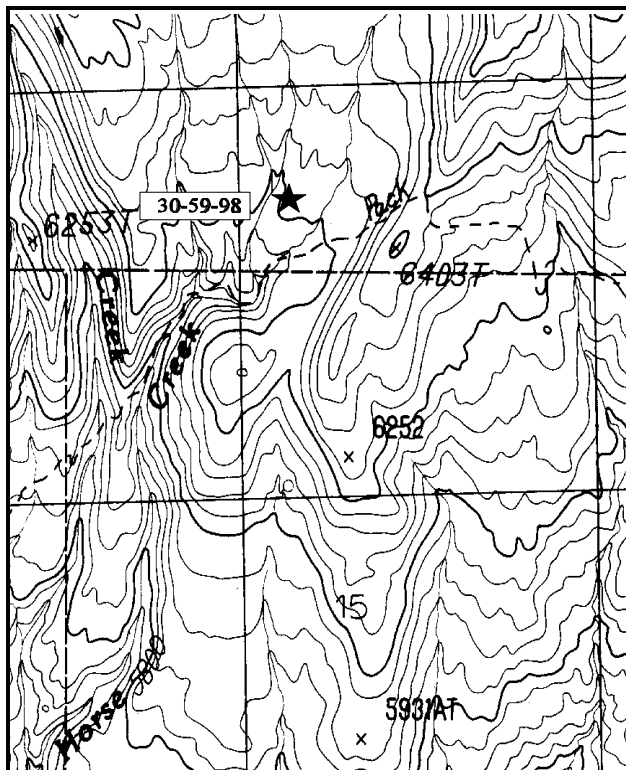
Range type: Burn .

Compass azimuth: frequency baseline 210 M degrees. (Line 2 193°, line 3 290°)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

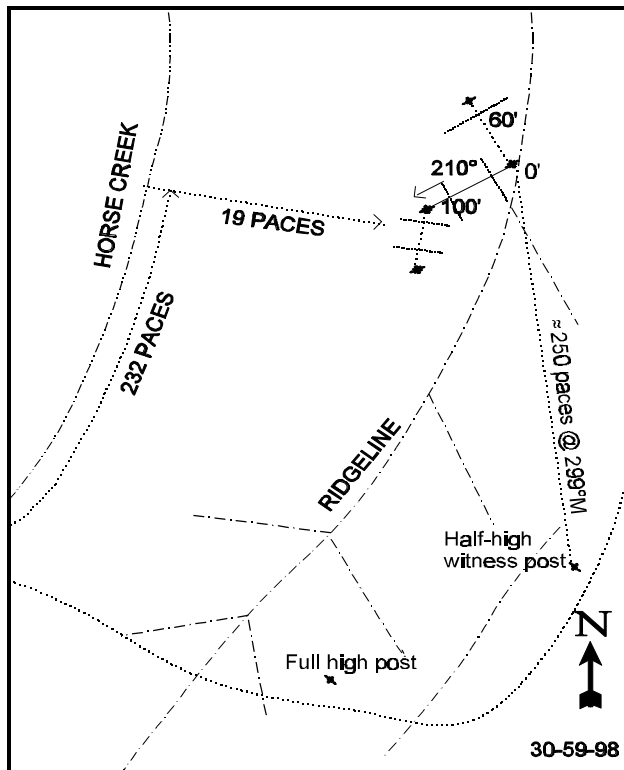
LOCATION DESCRIPTION

From Oak Grove campground travel back down the road about 2 miles to the Jones Hollow trail head on the northeast side of the road (it is blocked off by boulders). Park here and hike up the trail about 3/4 of a mile to Spirit Creek. Cross the creek and continue northeast for approximately 1/4 of a mile to horse creek. Follow the trail along the north side of the east fork of Horse Creek upstream to a half-high witness post. Walk approximately 250 paces at 299°M to the base of the ridge where there is a green fence post marking the 0-foot end of the frequency baseline. All transect stakes are 1½ foot tall green steel fence posts. The baseline starts on top of the ridge.



Map Name: Signal Peak

Township 40S , Range 14W , Section 10



Diagrammatic Sketch

UTM 4132876.911 N , 286202.829 E

## DISCUSSION

### Trend Study No. 30-59 (50A-30)

The Upper Horse Creek study samples a burned curlleaf mountain mahogany site. Elevation is approximately 6,200 feet with a southeast aspect and slope of 5% to 8%. The site was previously dominated by large mature curlleaf mountain mahogany trees with an oak understory. A wildfire burned the area in June of 1986 which killed all the mahogany. Deer use this area in the summer and year-long during mild winters. Nearby Horse Creek provides year-round water. Pellet group data from 1998 estimate 31 deer days use/acre. Counts may have been under estimated due to the difficulty in seeing pellet groups in the thick herbaceous vegetation.

The soil is moderately deep, but very rocky with abundant large rocks on the surface and within the profile. These rocks are large and appear to be granite. Effective rooting depth (see methods) is estimated at nearly 19 inches. Soil texture is a sandy loam with a moderately acid pH (6.0). Erosion increased immediately after the fire and continued in 1987. Basal vegetative cover was less than 1% in 1986. Bare ground averaged 19% while litter remaining after the fire covered 50% of the ground surface. Basal vegetative cover increased to 5% by 1987, but bare ground increased to 45% and litter declined to 21%. Soil movement, active gullies, and other signs of erosion were reported during both years. By 1992, conditions had improved. Basal vegetative cover increased to 14%, litter increased to 48%, and bare ground declined to 12%. No signs of erosion were noticeable. During the 1998 reading, conditions improved slightly with percent bare ground declining slightly. Litter cover increased from 48% to 57% and rock cover declined from 25% to 16%. There are currently no signs of erosion on the site, although there is a gully nearby which shows some signs of activity during high runoff events.

Curlleaf mountain mahogany was eliminated after the fire, but Utah serviceberry, Gambel oak, and a Gambel-shrub live oak hybrid, sprouted profusely. During the 1986 reading, there were an estimated 2,600 serviceberry and 3,499 oak seedlings per acre. The only other browse found included a small number of yellowleaf silktassel seedlings and an unidentified browse. By 1987, population densities of serviceberry increased to 4,333 young and 400 seedlings per acre. Oak densities declined to 1,532 young and seedlings per acre. Desert ceanothus was encountered in 1987 with an estimated density of 600 plants/acre. Between 1987 and 1992, serviceberry densities declined by 54% to 1,999 plants/acre. Gambel oak declined from 833 to 166 plants/acre, while the oak hybrid decreased from 533 to 433 plants/acre. Reproductive potentials of all species have declined. Desert ceanothus density remained fairly constant with an estimate of 566 plants/acre. A much larger sample was used in 1998 which better estimates shrub populations which often have discontinuous and/or aggregated distributions. As a result, some of the population density changes may be due to the change in sample size. Currently, density of serviceberry is estimated at 560 plants/acre. Density of desert ceanothus also declined from 566 to 180 plants/acre. Since there are no dead or decadent plants for either species, the change in density is due to the increased sample. More Gambel oak was encountered in the larger sample. Density increased 93%, from 166 to 2,320 plants/acre. Mature plants averaging nearly 4 feet in height represent 68% of the population. No seedlings were encountered, yet young plants are fairly abundant.

Utilization of serviceberry was moderate in 1987 and 1992, while browsing on oak has been light. Use of desert ceanothus was mostly light with some plants displaying moderate to heavy use in 1992. Utilization of browse was mostly light in 1998, but some moderate and heavy use was noted on serviceberry and desert ceanothus. Vigor is good on most shrubs, but reproduction is poor for serviceberry and desert ceanothus. No oak seedlings were found in 1998, although young plants account for 27% of the population.

During the first reading in September of 1986, no perennial grasses were encountered, while only two forbs were found. Since then, seeded exotic grasses consisting of crested and intermediate wheatgrass, smooth brome, and alfalfa dominate the understory and provide intense competition to shrub recruitment. However, this is not very important on a summer range. Cheatgrass brome is also well established. It currently

provides 28% of the grass cover. The forb component is dominated by the seeded alfalfa which currently ('98) provides 76% of the forb cover. The only other fairly abundant forb is wormwood. Alfalfa was heavily utilized in 1992, but appeared unutilized as of June 4<sup>th</sup>, 1998.

### 1992 TREND ASSESSMENT

Soil conditions have improved since 1986 and 1987. Basal vegetative cover has increased from less than zero to 14% by 1992. Litter cover has increased to 48%, while bare ground has declined to only 12%. Key browse species increased dramatically after the burn, then declined in density between 1987 and 1992. All species currently display reduced reproductive potentials. It appears that competition from the herbaceous understory and the moderate to heavy wildlife use are effectively controlling shrub recruitment. But again, not important on this summer range. Trend for browse is slightly down since 1987. Seeded exotic grasses, crested wheatgrass, intermediate wheatgrass, and the seeded forb alfalfa dominate the site. Nested frequencies of these plants have increased steadily since the fire. On the downward side, cheatgrass brome is also well established. Overall, trend for herbaceous understory is up.

#### TREND ASSESSMENT

soil - improved

browse - slightly down

herbaceous understory - up

### 1998 TREND ASSESSMENT

Trend for soil is up slightly with a slight decline in percent bare ground and an increase in litter cover from 48% to 57%. Currently, there is no problem with erosion on the site. Trend for browse appears stable. The changes in density appear to be due to the larger sample. Use of the browse is mostly light and recruitment adequate to maintain populations at current levels. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of perennial grasses and forbs. Nested frequency of smooth brome increased significantly, while frequency of crested wheatgrass and intermediate wheatgrass remained similar. Eleven new perennial forb species were encountered in the new sample. The dominant forb, alfalfa, remained at a similar frequency compared to 1987 and 1992.

#### TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - up slightly

### HERBACEOUS TRENDS --

Herd unit 30 , Study no: 59

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover % '98
		'86	'87	'92	'98	'86	'87	'92	'98	
G	Agropyron cristatum	a-	b26	c80	c62	-	11	28	27	2.00
G	Agropyron intermedium	a-	b45	c179	c191	-	21	61	60	11.51
G	Agropyron smithii	-	-	-	4	-	-	-	1	.03
G	Bromus inermis	a-	a4	a4	b33	-	1	2	12	1.17
G	Bromus tectorum (a)	-	-	-	159	-	-	-	52	6.13
G	Carex spp.	-	-	-	2	-	-	-	1	.15
G	Dactylis glomerata	-	3	-	3	-	1	-	1	.15

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover % 08
		'86	'87	'92	'98	'86	'87	'92	'98	
G	Festuca ovina	-	-	-	3	-	-	-	1	.03
G	Leucopoa kingii	-	2	-	-	-	1	-	-	-
G	Poa fendleriana	-	-	4	2	-	-	1	2	.09
G	Sitanion hystrix	-	-	1	3	-	-	1	2	.06
G	Sporobolus cryptandrus	a-	a-	a-	b <sup>23</sup>	-	-	-	11	.84
Total for Annual Grasses		0	0	0	159	0	0	0	52	6.13
Total for Perennial Grasses		0	80	268	326	0	35	93	118	16.06
Total for Grasses		0	80	268	485	0	35	93	170	22.20
F	Agoseris glauca	-	-	-	2	-	-	-	1	.03
F	Allium spp.	a-	a-	a-	b <sup>17</sup>	-	-	-	6	.05
F	Artemisia dracunculus	a-	a-	ab <sup>2</sup>	b <sup>25</sup>	-	-	1	11	1.39
F	Artemisia ludoviciana	-	-	4	7	-	-	1	2	.30
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	.01
F	Crepis acuminata	-	-	3	1	-	-	1	1	.03
F	Cryptantha spp.	-	-	-	4	-	-	-	1	.00
F	Delphinium nuttallianum	-	-	-	3	-	-	-	1	.00
F	Dichelostemma pulchellum	a-	a-	a-	b <sup>12</sup>	-	-	-	6	.05
F	Dracocephalum parviflorum	-	-	7	-	-	-	3	-	-
F	Epilobium paniculatum (a)	-	-	-	3	-	-	-	1	.00
F	Erodium cicutarium (a)	-	5	-	-	-	2	-	-	-
F	Erigeron spp.	a-	a-	a-	b <sup>14</sup>	-	-	-	6	.08
F	Eriogonum racemosum	-	-	-	2	-	-	-	1	.03
F	Gilia spp. (a)	-	-	-	3	-	-	-	2	.01
F	Lappula occidentalis (a)	-	-	-	9	-	-	-	4	.04
F	Lupinus argenteus	-	-	-	-	-	-	-	-	.03
F	Machaeranthera canescens	-	-	8	7	-	-	3	3	.04
F	Medicago sativa	-	74	85	71	-	36	36	27	10.00
F	Microsteris gracilis (a)	-	-	-	69	-	-	-	31	.42
F	Nicotiana attenuata (a)	-	2	-	-	-	1	-	-	-
F	Polygonum douglasii (a)	-	-	-	1	-	-	-	1	.00
F	Senecio multilobatus	-	1	3	-	-	1	1	-	-
F	Sphaeralcea grossulariaefolia	a <sup>4</sup>	ab <sup>17</sup>	b <sup>29</sup>	a <sup>11</sup>	2	8	14	5	.37
F	Taraxacum officinale	-	-	1	-	-	-	1	-	-
F	Tragopogon dubius	-	-	-	1	-	-	-	1	.00
F	Trifolium spp.	-	1	-	-	-	1	-	-	-
F	Unknown forb-annual (a)	-	4	-	-	-	2	-	-	-
F	Unknown forb-perennial	2	-	-	-	1	-	-	-	-
F	Verbascum thapsus	-	-	3	-	-	-	1	-	-
F	Viguiera multiflora	-	-	-	5	-	-	-	3	.18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover % 08
		'86	'87	'92	'98	'86	'87	'92	'98	
	Total for Annual Forbs	0	11	0	87	0	5	0	41	0.50
	Total for Perennial Forbs	6	93	145	182	3	46	62	75	12.62
	Total for Forbs	6	104	145	269	3	51	62	116	13.12

Values with different subscript letters are significantly different at  $\alpha = 0.10$  (annuals excluded)

#### BROWSE TRENDS --

Herd unit 30 , Study no: 59

Type	Species	Strip Frequency 08	Average Cover % 08
B	Acer grandidentatum	0	-
B	Amelanchier utahensis	21	2.63
B	Arctostaphylos patula	0	-
B	Artemisia tridentata vaseyana	1	.03
B	Ceanothus greggii	9	2.13
B	Cercocarpus ledifolius	1	.15
B	Clematis columbiana	2	-
B	Garrya flavescens	6	1.61
B	Opuntia spp.	1	.15
B	Quercus gambelii	31	7.34
B	Quercus gambelii-turbinella hybrid	0	-
B	Ribes spp.	0	-
B	Symphoricarpos oreophilus	0	-
	Total for Browse	72	14.05

#### CANOPY COVER --

Herd unit 30 , Study no: 59

Species	Percent Cover 08
Acer grandidentatum	2
Quercus gambelii	2

# BASIC COVER --

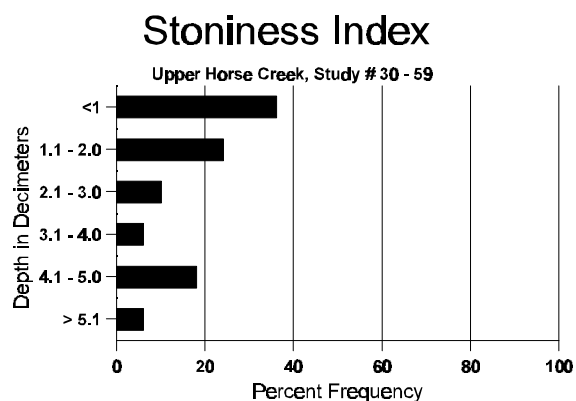
Herd unit 30 , Study no: 59

Cover Type	Nested Frequency 08	Average Cover %			
		'86	'87	'92	'98
Vegetation	353	0	5.00	13.75	48.02
Rock	166	25.75	25.75	24.75	16.25
Pavement	50	5.00	4.00	1.75	.84
Litter	383	50.00	20.75	48.25	57.31
Cryptogams	7	0	0	0	.04
Bare Ground	137	19.25	44.50	11.50	10.26

# SOIL ANALYSIS DATA --

Herd Unit 30, Study # 59, Study Name: Upper Horse Creek

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.5	45.3 (17.7)	6.0	72.0	17.4	10.6	2.1	16.2	86.4	.5



# PELLET GROUP FREQUENCY --

Herd unit 30 , Study no: 59

Type	Quadrat Frequency 08
Deer	18

## BROWSE CHARACTERISTICS --

Herd unit 30, Study no: 59

Field unit 56, Study no. 59																			
A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Acer grandidentatum																			
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	136	142	0	
% Plants Showing <u>Moderate Use</u> <u>Heavy Use</u> <u>Poor Vigor</u> <u>%Change</u>																			
		'86		00%		00%		00%											
		'87		00%		00%		00%											
		'92		00%		00%		00%											
		'98		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)															'86	0	Dec:	-	
															'87	0		-	
															'92	0		-	
															'98	0		-	
Amelanchier utahensis																			
S	86	78	-	-	-	-	-	-	-	-	78	-	-	-	2600			78	
	87	12	-	-	-	-	-	-	-	-	12	-	-	-	400			12	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	80	50	-	-	-	-	-	-	-	130	-	-	-	4333			130	
	92	9	11	-	3	-	-	-	-	-	23	-	-	-	766			23	
	98	13	-	-	-	-	-	-	-	-	12	1	-	-	260			13	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	11	22	3	1	-	-	-	-	-	36	-	1	-	1233	26	25	37	
	98	11	2	2	-	-	-	-	-	-	15	-	-	-	300	33	31	15	
% Plants Showing <u>Moderate Use</u> <u>Heavy Use</u> <u>Poor Vigor</u> <u>%Change</u>																			
		'86		00%		00%		00%											
		'87		38%		00%		00%											
		'92		55%		05%		02%											
		'98		07%		07%		00%											
Total Plants/Acre (excluding Dead & Seedlings)															'86	0	Dec:	-	
															'87	4333		-	
															'92	1999		-	
															'98	560		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Arctostaphylos patula																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22 45	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			100%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	33		-			
												'98	0		-			
Artemisia tridentata vaseyana																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	22 39	1	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	0		-			
												'98	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ceanothus greggii																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	4	-	-	-	-	-	-	-	-	4	-	-	133			4	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	18	-	-	-	-	-	-	-	-	18	-	-	600			18	
	92	-	-	-	-	-	-	2	-	-	2	-	-	66			2	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	7	3	3	2	-	-	-	-	-	14	1	-	500	11	18	15	
	98	7	2	-	-	-	-	-	-	-	9	-	-	180	23	44	9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%			- 6%							
'92		18%			18%			00%			-68%							
'98		22%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	600		-			
												'92	566		-			
												'98	180		-			
Cercocarpus ledifolius																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	1	1	-	-	-	-	-	-	-	2	-	-	66			2	
	98	2	-	-	-	-	-	-	-	-	2	-	-	40			2	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0	44	30	0	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	80			4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		50%			00%			00%			-39%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	66		-			
												'98	40		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Clematis columbiana																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	-	60	35	25
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'86		00%				00%				00%								
'87		00%				00%				00%								
'92		00%				00%				00%								
'98		00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	0		-			
												'98	60		-			
Garrya flavescens																		
S	86	7	-	-	-	-	-	-	-	-	7	-	-	-	233			7
	87	7	-	-	-	-	-	-	-	-	6	1	-	-	233			7
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	87	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	6	1	-	-	-	6	1	-	-	233	12	11	7
	98	7	-	-	2	-	-	-	-	-	8	-	1	-	180	29	49	9
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
'86		00%				00%				00%								
'87		00%				00%				00%								
'92		86%				14%				00%				-12%				
'98		00%				00%				09%				- 6%				
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'87	266		0%			
												'92	233		0%			
												'98	220		9%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	1	-	-	-	-	-	-	-	-	-	1	-	-	33		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	1	-	-	-	-	-	-	-	-	-	-	1	-	33	7	13	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20	8	12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%			+ 0%							
'92		00%			00%			100%			-39%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	33		-			
												'92	33		-			
												'98	20		-			
Quercus gambelii																		
S	86	53	-	-	-	-	-	-	-	-	53	-	-	-	1766		53	
	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	92	4	-	-	-	-	-	-	-	-	1	-	3	-	133		4	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	25	-	-	-	-	-	-	-	-	19	6	-	-	833		25	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	31	-	-	-	-	-	-	-	-	31	-	-	-	620		31	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	3	1	-	-	-	-	-	-	-	4	-	-	-	133	50	43	
	98	74	1	-	4	-	-	-	-	-	79	-	-	-	1580	44	45	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	6	-	-	-	-	-	-	-	-	-	1	5	-	120		6	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	400		20	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%			-80%							
'92		20%			00%			00%			+93%							
'98		.86%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'87	833		0%			
												'92	166		0%			
												'98	2320		5%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii-turbinella hybrid																		
S	86	52	-	-	-	-	-	-	-	-	52	-	-	-	1733		52	
	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	16	-	-	-	-	-	-	-	-	16	-	-	-	533		16	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	12	-	-	-	-	-	12	-	-	-	400	63	47	12
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%			-19%							
'92		08%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	533		-			
												'92	433		-			
												'98	0		-			
Ribes spp.																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	59	46	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	0		-			
												'98	0		-			
Symphoricarpos oreophilus																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30	56	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	0		-			
												'98	0		-			

Trend Study 30-60-98

Study site name: Jones Hollow I.

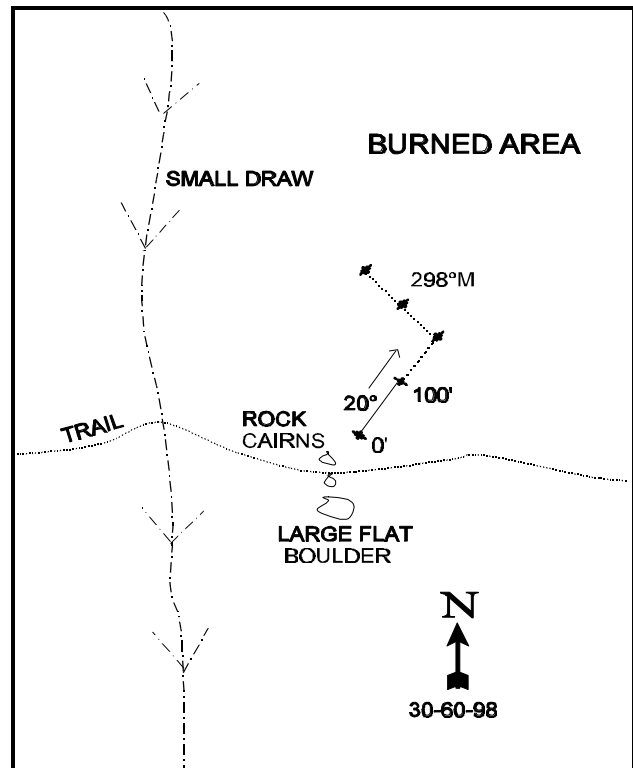
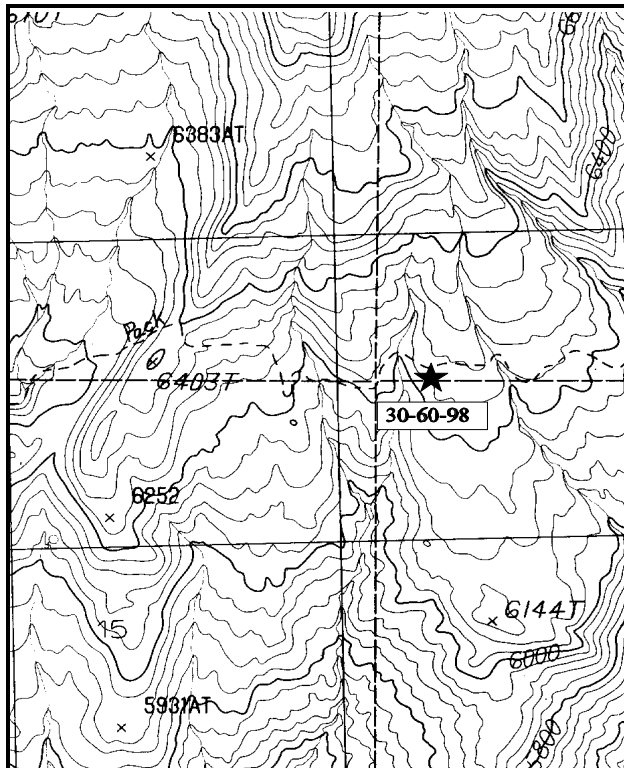
Range type: Burn.

Compass azimuth: frequency baseline 20 M degrees. (Lines 3 & 4 298°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

## LOCATION DESCRIPTION

From Oak Grove campground travel back down the road about 2 miles to the Jones hollow trail head on the northeast side of the road (it is blocked off by boulders). Park here and hike up the trail about 3/4 of a mile to Spirit Creek. Cross the creek and continue northeast for approximately 1/4 of a mile to horse creek. Continue to where the trail goes to the right and goes out of a small wash. From here follow the trail for 937 paces (close to 1 mile) over several hills and creek crossings until you get on top of a relatively flat, rocky table. Rock cairns mark the transect site along the trail. Also, right across the trail from where the transect starts is a seasonal pool. The frequency baseline begins on the north (left) site of the trial and is marked by a 1½ tall, green fence post with browse tag #7860 attached. All transect stakes are 1½ foot tall green fence posts.



Map Name: Signal Peak

### Diagrammatic Sketch

Township 40S , Range 14W , Section 11

UTM 4132577.295 N, 287381.180 E

## DISCUSSION

### Trend Study No. 30-60 (50A-31)

The Jones Hollow trend study is on mixed mountain brush, on a nearly level southwest facing slope on the east side of the Pine Valley Mountains. Elevation is approximately 6,200 feet. The entire area was burned by a wild fire in early June of 1986. Unlike the Upper Horse Creek site, this area received very little seed after the fire. Deer utilize this during the summers and year-round during mild winters, but at a lower intensity than Upper Horse Creek or Spirit Creek. Pellet group data from 1998 estimate only 17 deer days use/acre. Two antler sheds were also found in 1998.

Soils are coarse, sandy, shallow, and loosely compacted with large amounts of granite rock boulders on the surface and in the profile. Effective rooting depth (see methods) is estimated at almost 15 inches. Soil texture is a sandy loam with a slightly acid pH (6.1). Even with the slight slope, erosion has been a problem due to the lack of protective herbaceous cover. Large bare areas occur between oak clones and the bases of grasses are pedestaled. However, conditions have improved steadily since the fire. Bare ground, which occupied 71% of the ground surface in 1986, and 63% in 1987, declined to 22% by 1998. Basal vegetative cover increased from 2% in 1986 to 5% by 1992. Litter cover has also steadily increased from 12% in 1986 to 56% by 1998. Rock and pavement cover combined have remained fairly constant.

Browse is diverse with ten species occurring on the site. The key species consist of Utah serviceberry, Gambel oak, and shrub-live oak. Other species which occur in small numbers included greenleaf manzanita, mountain big sagebrush, desert ceanothus, narrowleaf yerba-santa, opuntia, and yellowleaf silktassel. Serviceberry, resprouting after the fire, had an estimated density of 10,533 seedlings and young per acre in 1986. It's density declined, but appeared to stabilize in 1992. Currently ('98), there are an estimated 1,520 plants/acre. Reproductive potential and proportion of young plants in the population have steadily declined since 1986, but current recruitment is sufficient to maintain the population at current levels. Utilization has been light to moderate since 1986.

Gambel and shrub-live oak, also resprouting after the fire, have declined steadily on the density plots between 1986 and 1992 as part of a natural thinning process. The much larger sample used in 1998 picked up more Gambel and shrub-live oak with estimated densities of 3,920 and 1,480 plants/acre respectively. Mature oak now averages five feet in height, creating thick clones which are mostly unavailable to wildlife. Oak is lightly utilized in all years and is in generally good vigor. Preferred understory shrubs consisting of mountain big sagebrush and desert ceanothus, provide additional forage. These shrubs occur in low numbers, and receive moderate use.

The herbaceous understory on this site is sparse when compared to the other burn sites. All grasses combined produce less than 1% cover with the annual, cheatgrass, providing 49% of that cover. Smooth brome, intermediate wheatgrass and bottlebrush squirreltail are the most abundant perennial grasses on the site but they occur rarely. None have a quadrat frequency of more than 6%. Forbs are more diverse and abundant with American vetch being the most numerous as it provides 69% of the forb cover. Wild onion and blue dicks (*Dichelostemma pulchellum*) are also fairly common. Sum of nested frequency for grasses has remained relatively stable since 1987, while frequency of forbs has increased with each reading.

### 1992 TREND ASSESSMENT

Since the burn, soil conditions have improved. Basal vegetative cover has increased from 2% to 5% since 1987, while bare ground has steadily decreased. Litter cover is increasing. Some erosion is still occurring on the site, but it is not significant. It will likely continue until the herbaceous understory becomes more extensively established. Trend for soil is up. There is a good mix of browse on the site. The key species,

Utah serviceberry and Gambel oak, increased dramatically right after the burn, then declined as natural thinning occurred. Currently, both appear to have healthy populations with adequate reproductive potentials. Trend for browse is stable. The herbaceous understory is deficient on this site. Sum of nested frequency for all grasses combined came to only 69 in 1992. Forbs are more common, but still deficient. Nested and quadrat frequencies for both forbs and grasses have increased steadily since 1986. Trend for herbaceous understory is up, but deficient.

#### TREND ASSESSMENT

soil - improved

browse - stable

herbaceous understory - up, but deficient

#### 1998 TREND ASSESSMENT

Trend for soil is up slightly. Protective ground cover continues to increase and percent bare ground continues to decline. Unfortunately, the herbaceous understory is poor, with the bulk of the vegetative cover coming from shrubs. There is some localized erosion occurring but it is minimized by the level terrain. Trend for the key browse species, serviceberry and Gambel oak, is stable. Serviceberry appears to have a stable population with steadily declining biotic potentials since the fire. The proportion of young plants has also decreased as the population becomes more mature. Utilization is light to moderate, vigor normal on most plants, and percent decadency low at only 7%. Gambel oak has increased in density from 1,000 to 3,920 stems/acre. This change is mostly due to the much larger sample used in 1998. Biotic potential and the proportion of young plants in the population has remained stable. Oak appears unutilized, in good vigor, with low decadence. Important understory shrubs, mountain big sagebrush and desert ceanothus, occur in small numbers, although they appear to be increasing. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has declined slightly, while frequency of perennial forbs has increased slightly. Composition and abundance of grasses is poor. All grasses produce less than 1% cover with annual cheatgrass providing 49% of that cover.

#### TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - stable, but grasses are deficient

#### HERBACEOUS TRENDS --

Herd unit 30 , Study no: 60

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover % '98
		'86	'87	'92	'98	'86	'87	'92	'98	
G	Agropyron cristatum	a-	b 16	b 11	a-	-	8	6	-	-
G	Agropyron intermedium	a-	ab 1	bc 12	c 15	-	1	4	5	.07
G	Bromus inermis	-	11	31	19	-	6	10	6	.13
G	Bromus tectorum (a)	-	-	-	74	-	-	-	30	.35
G	Dactylis glomerata	-	6	5	3	-	2	2	1	.03
G	Festuca ovina	-	-	6	-	-	-	3	-	-
G	Poa fendleriana	-	-	4	2	-	-	2	2	.04
G	Poa secunda	a-	b 9	a-	a-	-	4	-	-	-
G	Sitanion hystrix	a-	a-	a-	b 11	-	-	-	5	.10

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover % 08
		'86	'87	'92	'98	'86	'87	'92	'98	
G	Unknown grass - perennial	<sub>b</sub> 7	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	4	-	-	-	-
	Total for Annual Grasses	0	0	0	74	0	0	0	30	0.34
	Total for Perennial Grasses	7	43	69	50	4	21	27	19	0.37
	Total for Grasses	7	43	69	124	4	21	27	49	0.72
F	Agoseris glauca	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 8	<sub>ab</sub> 4	-	-	4	2	.01
F	Allium spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 68	-	-	-	28	.26
F	Arabis spp.	-	-	1	3	-	-	1	1	.00
F	Arabis holboellii	-	6	-	-	-	2	-	-	-
F	Astragalus straturensis	-	2	-	3	-	1	-	1	.03
F	Calochortus nuttallii	-	-	4	3	-	-	1	2	.01
F	Chaenactis douglasii	-	-	-	1	-	-	-	1	.00
F	Chenopodium fremontii (a)	-	5	-	-	-	4	-	-	-
F	Collomia grandiflora (a)	-	1	-	-	-	1	-	-	-
F	Cymopterus spp.	-	-	-	2	-	-	-	1	.03
F	Dichelostemma pulchellum	<sub>a</sub> -	<sub>a</sub> 2	<sub>b</sub> 24	<sub>b</sub> 40	-	1	12	14	.70
F	Epilobium paniculatum (a)	-	-	-	1	-	-	-	1	.00
F	Eriogonum racemosum	-	-	-	1	-	-	-	1	.03
F	Gilia spp. (a)	-	-	-	2	-	-	-	2	.01
F	Lotus utahensis	-	-	2	-	-	-	1	-	-
F	Melilotus officinalis	-	1	-	-	-	1	-	-	-
F	Medicago sativa	-	12	-	-	-	5	-	-	-
F	Microsteris gracilis (a)	-	-	-	55	-	-	-	22	.13
F	Nicotiana attenuata (a)	-	3	-	-	-	1	-	-	-
F	Penstemon eatoni	-	2	3	-	-	1	1	-	-
F	Senecio multilobatus	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 7	<sub>ab</sub> 1	-	-	4	1	.00
F	Sphaeralcea grossulariaefolia	<sub>a</sub> -	<sub>b</sub> 13	<sub>b</sub> 14	<sub>a</sub> -	-	8	7	-	-
F	Streptanthus cordatus	-	3	1	4	-	1	1	2	.06
F	Unknown forb-perennial	3	-	-	4	1	-	-	2	.16
F	Vicia americana	<sub>a</sub> 37	<sub>ab</sub> 54	<sub>c</sub> 106	<sub>bc</sub> 92	17	26	42	35	3.34
F	Zigadenus paniculatus	-	-	-	5	-	-	-	2	.03
	Total for Annual Forbs	0	9	0	58	0	6	0	25	0.15
	Total for Perennial Forbs	40	95	170	231	18	46	74	93	4.69
	Total for Forbs	40	104	170	289	18	52	74	118	4.84

Values with different subscript letters are significantly different at  $\alpha = 0.10$  (annuals excluded)

## BROWSE TRENDS --

Herd unit 30 , Study no: 60

T y p e	Species	Strip Frequency Ø8	Average Cover % Ø8
B	Amelanchier utahensis	31	9.75
B	Arctostaphylos patula	18	3.46
B	Artemisia tridentata vaseyana	12	.51
B	Ceanothus greggii	25	5.67
B	Eriodictyon angustifolium	18	.18
B	Garrya flavescens	13	2.80
B	Gutierrezia sarothrae	4	.21
B	Opuntia spp.	3	.00
B	Quercus gambelii	27	11.30
B	Quercus gambelii-turbinella hybrid	0	-
B	Quercus turbinella	11	7.74
B	Unknown browse	0	-
Total for Browse		162	41.65

## BASIC COVER --

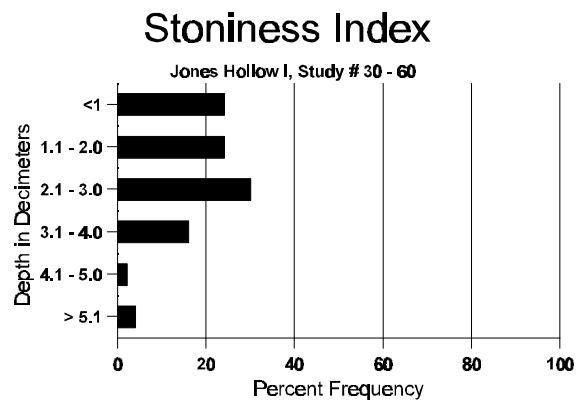
Herd unit 30 , Study no: 60

Cover Type	Nested Frequency Ø8	Average Cover %			
		'86	'87	'92	'98
Vegetation	272	2.00	1.50	5.25	47.57
Rock	109	9.50	9.75	6.00	7.06
Pavement	142	5.25	9.50	15.50	8.32
Litter	381	12.25	16.00	50.25	55.54
Cryptogams	3	0	0	0	.03
Bare Ground	173	71.00	63.25	23.00	21.59

## SOIL ANALYSIS DATA --

Herd Unit 30, Study # 60, Study Name: Jones Hollow 1

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.5	48.6 (16.1)	6.1	68.0	17.4	14.6	1.5	10.2	99.2	.7



PELLET GROUP FREQUENCY --  
Herd unit 30 , Study no: 60

Type	Quadrat Frequency
	08
Rabbit	4
Deer	13

## BROWSE CHARACTERISTICS --

Herd unit 30 , Study no: 60

Field Unit 56 ; Study no. 60																			
A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Amelanchier utahensis																			
S	86	132	-	-	-	-	-	-	-	-	127	-	5	-	4400			132	
	87	21	-	-	-	-	-	-	-	-	20	1	-	-	700			21	
	92	12	-	-	2	-	-	-	-	-	14	-	-	-	466			14	
	98	3	-	-	3	-	-	3	-	-	9	-	-	-	180			9	
Y	86	184	-	-	-	-	-	-	-	-	155	-	29	-	6133			184	
	87	74	10	3	-	-	-	-	-	-	87	-	-	-	2900			87	
	92	20	-	-	1	-	-	-	-	-	20	1	-	-	700			21	
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	13	-	-	-	-	-	-	-	-	13	-	-	-	433	40	49	13	
	98	47	16	1	3	-	-	-	-	-	67	-	-	-	1340	39	47	67	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	4	1	-	-	-	-	-	-	-	1	-	3	1	100			5	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>								
'86		00%			00%			16%			-53%								
'87		11%			03%			00%			-61%								
'92		00%			00%			00%			+25%								
'98		22%			01%			05%											
Total Plants/Acre (excluding Dead & Seedlings)												'86	6133	Dec:	0%				
												'87	2900		0%				
												'92	1133		0%				
												'98	1520		7%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4				1	2	3	4				
Arctostaphylos patula																
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	2	-	-	2	-	-	40		2
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	7	-	-	2	-	-	-	-	-	9	-	-	300		9
	98	1	-	-	-	-	-	-	-	-	1	-	-	20		1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	24	-	-	-	-	-	-	-	-	24	-	-	480	25 43	24
% Plants Showing		Moderate Use			Heavy Use			Poor Vigor			%Change					
'86		00%			00%			00%								
'87		00%			00%			00%								
'92		00%			00%			00%			+40%					
'98		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-	
												'87	0		-	
												'92	300		-	
												'98	500		-	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	3	-	-	-	-	-	-	-	-	3	-	-	100			3	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	1	-	-	1	-	-	-	-	-	2	-	-	66			2	
	98	3	-	-	1	-	-	-	-	-	3	1	-	80			4	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	92	2	-	-	-	-	-	-	-	-	2	-	-	66	17	18	2	
	98	8	1	-	3	-	-	-	-	-	12	-	-	240	22	31	12	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	33			1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
X	86	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	200			10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%			+48%							
'98		06%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'87	0		0%			
												'92	165		20%			
												'98	320		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Ceanothus greggii																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	46	-	-	-	-	-	-	-	-	46	-	-	-	1533		46
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	24	7	-	3	-	-	-	-	-	34	-	-	-	680	22 34	34
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
		'86 00%			00%			00%									
		'87 00%			00%			00%									
		'92 00%			00%			00%			+76%						
		'98 21%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'87	0		-		
												'92	166		-		
												'98	680		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Eriodictyon angustifolium																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	21	-	-	-	-	-	-	-	-	21	-	-	-	700		21
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	19	-	-	-	-	-	-	-	-	19	-	-	-	633	14	19
	98	21	-	-	1	-	-	-	-	-	15	2	4	1	440	25	22
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	1	1	-	-	-	-	-	-	-	2	1	60		3
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'87		00%			00%			00%			+16%						
'92		00%			00%			00%			-40%						
'98		00%			04%			32%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%		
												'87	700		0%		
												'92	833		0%		
												'98	500		12%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Garrya flavescens																		
S	86	35	-	-	-	-	-	-	-	-	35	-	-	-	1166		35	
	87	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	86	56	-	-	-	-	-	-	-	-	56	-	-	-	1866		56	
	87	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	3	-	-	-	-	-	3	-	-	-	60		3	
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	2	-	-	1	-	-	-	-	-	3	-	-	-	100	60	56	
	98	10	-	-	3	-	-	-	-	-	11	-	1	1	260	38	47	
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	2	-	-	-	-	-	-	-	-	-	2	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-86%							
'87		00%			00%			00%			-62%							
'92		00%			00%			00%			+72%							
'98		00%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	1866	Dec:	0%			
												'87	266		0%			
												'92	100		0%			
												'98	360		11%			
Gutierrezia sarothrae																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	12	-	-	-	-	-	-	-	-	12	-	-	-	240	5	6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-			
												'87	0		-			
												'92	0		-			
												'98	240		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Opuntia spp.																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	-	-	-	-	-	-	-	-	-	3	-	-	-	60	7	16
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	-	20		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%										
'87		00%			00%			00%										
'92		00%			00%			00%										
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	0%			
												'87	0		0%			
												'92	0		0%			
												'98	80		25%			
Quercus gambelii																		
S	86	55	-	-	-	-	-	-	-	-	55	-	-	-	1833			55
	87	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	86	179	-	-	-	-	-	-	-	-	179	-	-	-	5966			179
	87	93	-	-	-	-	-	-	-	-	45	48	-	-	3100			93
	92	3	-	-	3	-	-	-	-	-	6	-	-	-	200			6
	98	36	-	-	17	-	-	-	-	-	53	-	-	-	1060			53
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	18	-	-	6	-	-	-	-	-	24	-	-	-	800	64	51	24
	98	135	-	-	4	-	-	-	-	-	139	-	-	-	2780	52	30	139
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	4	-	-	-	-	-	-	-	-	3	1	-	-	80			4
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	600			30
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'86		00%			00%			00%			-48%							
'87		00%			00%			00%			-68%							
'92		00%			00%			00%			+74%							
'98		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'86	5966	Dec:	0%			
												'87	3100		0%			
												'92	1000		0%			
												'98	3920		2%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Quercus gambelii-turbinella hybrid																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	1	-	-	-	-	-	-	-	-	-	1	-	-	33		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	13	-	-	-	-	-	-	-	-	-	13	-	-	433		13
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			00%									
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'87	433		-		
												'92	0		-		
												'98	0		-		
Quercus turbinella																	
S	86	15	-	-	-	-	-	-	-	-	9	-	6	-	500		15
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	33		1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	86	77	-	-	-	-	-	-	-	-	47	-	30	-	2566		77
	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	66	-	-	-	-	-	-	-	-	66	-	-	-	1320	67 62	66
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'86		00%			00%			39%			-99%						
'87		00%			00%			00%									
'92		00%			00%			00%									
'98		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'86	2566	Dec:	-		
												'87	33		-		
												'92	0		-		
												'98	1480		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Unknown browse																	
S	86	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	87	15	-	-	-	-	-	-	-	-	15	-	-	500		15	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
		'86			00%			00%			00%						
		'87			00%			00%			00%						
		'92			00%			00%			00%						
		'98			00%			00%			00%						
Total Plants/Acre (excluding Dead & Seedlings)												'86	0	Dec:	-		
												'87	0		-		
												'92	0		-		
												'98	0		-		

## SUMMARY

### DEER HERD UNIT 30 - PINE VALLEY

Trend study sites on unit 30 - Pine Valley can be divided into 3 major categories. Eight sites sample summer range, 4 sites are placed on areas of important fawning habitat and the other 14 sample winter range. Of the 14 winter range sites, only 4 display a downward or slightly downward trend for soil, 3 sites have downward or slightly downward herbaceous trends, and 4 sites display downward or slightly downward browse trends. Of these winter range sites, Southwest of New Castle (#29), shows slightly downward trends in all areas. The Pahcoon Bench site (#46) has a slightly downward browse trend and a downward herbaceous trend due to the abundance of cheatgrass in the understory. Northwest of Enterprise (#52) displays a slightly downward soil trend and a downward browse trend.

The sites placed on important fawning habitat all show stable to upward trends except for Deep Canyon (#35). It displays a slightly downward soil and herbaceous understory trend. Summer range sites all show stable to upward soil and browse trends with two sites, Harmony Mtn Summit (#5) and Grassy Flat Ridge (#26), showing slightly downward herbaceous trends. All other summer range sites have stable to upward herbaceous trends. A summary table of trends is found below.

Site	1992			1998		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & Forbs
30-3 Upper Broad Hollow	+	-	0	0	0	+
30-5 Harmony Mtn Summit	+	+	+	0	0	-
30-9 Upper Lime Spring	0	+	0	0	0	0
30-12 Pintura Bench	-	-	-	0	+	-
30-13 Black Ridge	-	+	-	0	0	0
30-18 Grant's Ranch Trail	+	+	0	NR	NR	NR
30-24 Paradise	+	+	+	NR	NR	NR
30-26 Grassy Flat Ridge	0	+	+	0	+	-
30-29 Southwest of New Castle	+	+	+	-	-	-
30-35 Deep Cayon	0	+	+	-	+	-
30-37 Truman Bench	+	+	+	0	0	-
30-38 Wide Canyon	0	+	0	0	-	-
30-40 Telegraph Draw	+	+	0	-	0	0
30-41 Joe Spring	+	-	0	0	+	+
30-42 Grapevine Spring	0/-	+	-	-	+	+
30-45 Flat Top Mountain	NR	NR	NR	0	0	+
30-46 Pahcoon Bench	+	0	0/-	0	-	-

30-47 Lost Peak	NR	NR	NR	0	+	+
30-52 Northwest of Enterprise	+	-	0	-	-	+
30-53 Sevy Hollow	NR	NR	NR	0	-	0
30-54 Bullion Canyon	Established in 1998					
30-55 Quichapa Canyon	Established in 1998					
30-57 Woosley Reseed	Established in 1998					
30-58 Spirit Creek South Burn	+	+	0	+	+	+
30-59 Upper Horse Creek	+	-	+	+	0	+
30-60 Jones Hollow	+	0	+	+	0	0

(+) = upward trend, (-) = downward trend, (0) = stable trend, (0/-) = stable to slightly down, (NR) = not read

## DISCONTINUED TREND STUDIES UNIT 30 (50A)

### DISCUSSION

#### Trend Study No. 50A-2

\*\*\*This site was not read in 1998 and has been discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

This study is located immediately west of the town of New Harmony and is typical of the critical deer winter range in this area. Vegetatively, the site is dominated by juniper-pinyon on about a 10% slope with an easterly aspect. Elevation is 5,560 feet. The study site is approximately one-half mile above the deer proof fence surrounding New Harmony and is a known winter concentration area.

Soils are derived from igneous and metamorphic rock. They are shallow, rocky, and alluvially deposited with an apparent hardpan several inches below the surface. Ground cover is poor, but perhaps slightly better than in Lower Broad Hollow. Erosion and soil loss were occurring at an accelerated rate in 1982, but seem to have subsided since the last reading due to an increase in protective ground cover. Basal vegetative cover has doubled since 1982 and bare ground has decreased by 52% (21% to 10%). Even with this increase in basal cover, it is still very low at only 2%. Rock and pavement cover combined have more than doubled indicating past soil loss.

Vegetative overstory is composed of nearly equal amounts of Utah juniper and singleleaf pinyon pine. Combined tree density was estimated using the point quarter method at 324 trees/acre. Fifty percent of the pinyon were classified as seedlings and appear to be on the increase. Eighty percent of the juniper sampled were composed of trees greater than eight feet in height. No seedlings and few young were counted. Understory vegetation is dominated by shrub live oak. Density of oak has declined from 10,332 to 2,499 stems/acre, a 76% decrease. The remaining browse composition includes a number of desirable species, including true mountain mahogany, Utah serviceberry, and desert ceanothus. All are currently in fair to good vigor and moderately hedged, although they are only occasionally abundant and do not appear to be increasing. Utah serviceberry is the second most abundant browse species. It has declined slightly in density since 1982, while percent decadence has increased from zero to 43%. Serviceberry still has a good reproductive potential. Mountain mahogany was not encountered on the density plots during the 1992 reading. Other shrubs of lesser importance and/or desirability which occur on or near the site include; manzanita, pricklypear, and occasional individuals of antelope bitterbrush, Stansbury cliffrose, and Gambel oak. Use of all browse is light to moderate.

Herbaceous understory is badly depleted. Only two perennial grasses were encountered during the 1992 reading. These included mutton grass and bottlebrush squirreltail. Overall, perennial grasses were found in only 20% of the quadrats. Perennial forbs are more numerous but still deficient. They include heartleaf twistflower, Utah deervetch, lobeleaf groundsel, longleaf phlox, and bastard toadflax. Grasses and forbs are currently of little importance. Two annual forbs are of particular note. Annual lupine and a small annual milkvetch (*Astragalus* sp.) are both very abundant, but likely are of small importance to deer. Other annuals consist of cheatgrass brome, tansy mustard, autumn willoweed, and *Microsteris gracilis*.

#### 1982 APPARENT TREND ASSESSMENT

Soil condition is poor and declining. Vegetative cover is limited mostly to shrub or tree crowns and litter occurs only under tree or shrub canopies. Erosion has been heavy, leaving much exposed rock. Vegetative trend is stable to declining. With two exceptions, most vegetative parameters are fairly static. An encouraging sign is that 33% of the encountered Utah serviceberry plants were in either the young or seedling age-classes. However, of much greater importance is the apparent expansion of an already dominant shrub

live oak population. This species has an age structure composed of 7% seedlings, 49% young, 42% mature, and only 2% decadent plants.

#### 1992 TREND ASSESSMENT

Basal vegetative cover has increased from 1% to 2%, while bare ground has declined from 21% to 10%, a 52% decrease. Litter has remained basically unchanged. Rock and pavement cover have increased 54%, while cryptogamic cover has declined 71%. Overall, protective ground cover has risen from 80% to 90% since the last reading, but this is mostly from increases in rock and pavement cover. The soil trend has improved slightly since 1982, but the site is still in poor condition. Increased amounts of rock and pavement will help protect the soil from rain drop impact, but they may also negatively impact herbaceous plants and shrub seedlings due to increased soil temperatures. Trend for browse is down. Utah serviceberry has declined slightly since 1982, while percent decadence has increased from zero to 43%. The percent decadency of desert ceanothus has increased from zero to 60%. Shrub live-oak, the most abundant shrub, has shown a 76% decrease in density along with an increase in percent decadency. Some of these changes may be the result of increased density and dominance of pinyon and juniper trees which have increased 50% and 33% respectively since 1982. The herbaceous understory is sparse, but has improved since the last reading. Quadrat frequency for perennial grasses have improved slightly while species diversity has declined. Quadrat frequency and diversity of forbs have improved. Trend for herbaceous understory is up slightly, although still in very poor condition.

#### TREND ASSESSMENT

soil - up slightly, but in poor condition

browse - down

herbaceous understory - up slightly, but in poor condition

## DISCUSSION

### Trend Study No. 50A-10

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

This study occurs on the important fawn rearing areas near Bumblebee Spring. The predominate range type in this area is oakbrush. The study site is on a north-east aspect with a steep 30% slope at an elevation of 7,720 feet. Several does and a few buck mule deer were seen near the site. Water is available at the nearby Bumblebee spring. Oak provides excellent cover for deer and fawns. However, due to the thick brush, game trails provide the only means of travel through the area.

Soils are fine textured with some surface rock. The parent material is limestone. The actual study site has a nearly continuous canopy cover from Gambel oak, but little basal cover. Litter is abundant and prevents serious erosion. Southern and western slopes and ridge lines near the study site have much less cover and are eroded to a considerable degree.

Vegetative overstory is generally less than 6 feet in height and is composed principally of Gambel oak with lesser amounts of Utah serviceberry and bigtooth maple. Total browse density is high with Gambel oak accounting for 84% of the total browse composition in 1982, which is down to 65% in 1992. Oak has declined in density by 34% since 1982, while mature plants have nearly doubled in height and crown measurements. The population is composed largely of seedlings and young sprouts that are have good vigor and are essentially unutilized. Similar situations exist for most other browse species. Typical understory shrubs include Woods rose, mountain snowberry, black sagebrush, and mountain big sagebrush. The overall impression one gains from inspecting this site is that the browse component is excessively thick and dominant.

Grasses and forbs, in contrast on southern or western exposures, in this area are diverse and productive. However, if the shrub component continues to thicken, they will become less so. Ten grass species were encountered on the frequency study. Sedge was the most common with lesser amounts of Letterman needlegrass, subalpine needlegrass, Canada bluegrass, mountain brome, crested wheatgrass, and Kentucky bluegrass.

Forbs are both abundant and diverse. The more common species have at least intermediate value. Important forbs include thistleleaf peavine, American vetch, Eaton fleabane daisy, redroot eriogonum, western waterleaf, tailcup lupine, and Nelson larkspur.

### 1982 APPARENT TREND ASSESSMENT

In this area, exposure makes a great difference in range condition. Southern and western exposures are in poorer condition and are dominated by manzanita. The study site, on a northeastern exposure, is in fair to good condition. Soils are stable but have high potential erodibility. As habitat, the vegetation is rather low growing and hence provides only minimum cover. Total forage production is high but dominated by browse, especially Gambel oak. A moderate herbaceous understory is present, but can be expected to decline if oak continues to thicken and gain height. However, it may be that the site potential will not permit higher growth or that the browse component may be self-thinning.

### 1992 TREND ASSESSMENT

Basal vegetative cover has increased from 1% in 1982 to 9% by 1992, a 89% increase. Bare ground has declined by 53%. There are still some bare areas and trails between shrub canopies which show erosion.

Overall the soil trend has improved. The browse on the site is dominated by Gambel oak which has declined 34% in density since 1982. Currently there is an estimated 17,399 stems/acre of oak, the majority of which are seedlings and young. Mature plants have shown significant increases in height and crown measurements since the last reading. Some insect damage was noted in 1992, but the oak here are in much better condition than the oak on the surrounding areas. The thick nature of the oak makes travel through the area possible only on game trails. A prescribed burn would benefit this area. Utah serviceberry has increased 40% in density and bigtooth maple has shown up in the density plots with an estimated 2,599 plants/acre, indicating a possible successional change is taking place on this site. Overall the browse trend is stable. The herbaceous trend is up slightly due to increased quadrat frequencies of grasses and forbs.

#### TREND ASSESSMENT

soil - improved

browse - stable

herbaceous understory - up slightly

## DISCUSSION

### Trend Study No. 50A-16

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Upper Leads Creek trend study is on low summer or high winter range near the base of the steep escarpment at the head of Leeds Creek. Elevation of the study is 7,000 feet. This entire area is characterized by exceptionally dense, and in places, nearly impenetrable mountain brush. The study area is on a 20% slope with a south aspect. Immediately above, the slope becomes increasingly steeper and within a short distance becomes steep and rocky enough to present a barrier to deer movement. A large wildfire burned the area in June of 1986. The Dixie National Forest seeded the burn in early July.

Soils are extremely rocky and moderately shallow. Rock cover increased from 17% in 1982 to 36% after the fire in 1986. Bare soil increased from only 3% in 1982 to a high of 41% in 1987. By 1992, bare ground decreased to near preburn conditions (4%). Basal vegetative cover has remained low, while aerial cover from mature shrubs has come back. Litter cover has increased significantly since the burn. Before the burn, erosion was generally low. However, there were some large gullies in the area that originated on the steep and more barren slopes above. Erosion was considered moderate after the fire. Plant roots were exposed, soil movement was detectable, and small gullies appeared. Currently erosion is not a problem. The abundant litter and shrub canopy cover seem to adequately protect the soil.

Before the burn, key browse species included Gambel oak and Utah serviceberry. Gambel oak had a density of 3,000 stems/acre, while serviceberry's density was at 400 plants/acre. These two shrubs comprised 76% of the total browse density estimated at 4,300 plants/acre. This fairly low density does not really characterize the extremely thickness of the browse growing on this site. Most plants are mature, very bushy, often with intertwining branches, making travel through the area difficult. Deer also would have trouble navigating the area and forage availability would be somewhat limited. Utilization of all browse species was very light. A large wildfire burned 10,000 acres on the east side of the Pine Valley mountains in early June of 1986. After the fire, sprouting Gambel oak was estimated at 16,566 stems/acre. An additional 9,100 individuals/acre were classified as seedlings. Shrub live-oak, also sprouting, increased from 333 stems/acre in 1982 to 4,433 seedlings and young by 1986. Serviceberry had an estimated density of 1,199 seedlings and young per acre by 1986. A year after the fire there were an estimated 1,100 serviceberry, 766 shrub live oak, and 3,300 Gambel oak per acre. All were lightly utilized and in good vigor. By 1992, serviceberry had declined to 399 plants/acre, 75% classified as young. Gambel oak increased 28% to 4,566 stems/acre while shrub live-oak declined to 400 stems/acre. Mature Gambel oak trees currently average just over five feet in height with a crown of about four feet, making much of the oak unavailable to browsing. Desert ceanothus appeared on the site by 1992 with an estimated density of 2,066 plants/acre. All browse are lightly utilized and in good vigor.

Before the burn, the dense shrub canopy severely inhibited herbaceous growth. A few scattered grasses and forbs were found in canopy openings. Species include muttongrass, sedge, mountain brome, bastard toadflax, lobeleaf groundsel and Utah deervetch, all of which are ungrazed. The Forest Service seeded several introduced and native grasses and forbs in early July of 1986. During the reading in September, no perennial grasses were encountered. The only forbs found included bastard toadflax and Utah deervetch. One year later several seeded and native grasses were established. The seeding would have been much more successful if it had been done later in the fall of 1986, with better opportunities for stratification and germination. Orchard grass and smooth brome were the most common seeded grasses. Ten species of forbs were counted, but no seeded forbs occurred. Nested and quadrat frequencies of grasses and forbs continued to increase between 1987 and 1992. Smooth brome, big mountain brome, and mutton grass were the most common. Eleven forb species were encountered with lobeleaf groundsel, rockcress, sego lily, Utah deervetch, and redroot eriogonum being the most common. Overall, forbs and grasses are still deficient on the site, although

composition and diversity have improved dramatically since the burn. Further increases in the shrub canopy will eventually reverse this trend.

#### 1982 APPARENT TREND ASSESSMENT

Current soil and vegetative trend are both stable, however habitat conditions for deer are well below optimum. It is difficult to envision that the shrubs could become more dense than they already are. It is equally unlikely that any natural thinning will occur without some external influence, such as fire. Excessive shrub density, which limits herbaceous growth and deer access, is a serious problem on this area. Thinning, either by fire or mechanical means, is definitely recommended. However, either method would have to be repeated at fairly frequent intervals to maintain a desired condition. The principal shrubs are all species that sprout profusely following fire or top removal. Herbicides could be tried, but likely would be less satisfactory.

#### 1992 TREND ASSESSMENT

Soil conditions deteriorated immediately after the burn. Basal vegetative cover only declined slightly, but bare ground increased to 33% in 1986 and 41% by 1987. Rock cover nearly doubled while litter cover declined 67%. The extended drought accelerated these downward trends. By 1992, basal vegetative cover equals preburn estimates, rock cover is still high at 33%, bare ground has declined to 4%, and litter cover has rebounded to 55%. Erosion is not currently a problem on this site. Trend for soil is up. Browse was overly mature before the burn and nearly inaccessible to deer. After the burn, sprouting oak and serviceberry came back well. By 1992, oak was dominant with an estimated density of 4,566 stems/acre. Serviceberry has declined from a high of 1,100 plants/acre in 1987 to only 399 in 1992. Desert ceanothus has returned to the site and is the second most abundant shrub with an estimated 2,066 plants/acre. Overall, the browse density and composition has improved, but continued increases in browse size will eventually make much of the forage unavailable to deer. Browse trend is up. The herbaceous understory was nearly nonexistent before the fire. By 1987, several seeded and native grasses and forbs were established. Since then, nested and quadrat frequencies have continued to increase. This trend will inevitably reverse itself as the browse component becomes more dense. Continued use of fire or herbicides will be needed in the future. Trend for herbaceous understory is up.

#### TREND ASSESSMENT

soil - up

browse - up

herbaceous understory - up

## DISCUSSION

### Trend Study No. 50A-19

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Big Water Reservoir trend study is located about 200 feet east-northeast of the dam at Big Water Reservoir. The range type is mixed mountain brush and is considered to be within the deer summer range of the Pine Valley Mountains. The site is also within the "roadless" area and can be reached only by foot or horseback. Mountain brush and oakbrush types similar to this one are widely used as fawn rearing habitat throughout the entire area. The Big Water site was specifically chosen by the district conservation officer to sample this kind of habitat. Elevation is approximately 7,900 feet and slope varies from 55% to 65%. Aspect is south to southwest.

Soils are rather shallow, coarse, and rocky but have a relatively high organic content in the upper horizon. Below about the six-inch depth, however, soil material is relatively undifferentiated and there appears to be no clearly defined B horizon. Soil movement is obvious, but is not greatly accelerated. Lichen lines on exposed rocks for instance, do not normally extend to the soil surface and there are plant roots exposed. Exposed bare ground covers an estimated 15% of the ground surface in 1982.

The principal browse species are Gambel oak, Utah serviceberry, mountain big sagebrush, curlleaf mountain mahogany, and Oregon hollygrape. Lesser quantities of antelope bitterbrush, stickleaf low rabbitbrush, and woods rose can also be found.

Gambel oak is the most abundant browse on the site with an estimated density of 5,666 stems/acre in 1982, declining to 4,866 by 1992. Two thirds of the oak consist of young plants. Mature plants measured about 2½ by 1½ feet in 1982. During the 1992 reading, oak averaged 5½ by 2 feet making an increasing amount of the oak unavailable to browsing. Mature Utah service berry and curlleaf mountain mahogany have also exhibited similar increases in size. Utah serviceberry declined in density by 51%, while the percentage of heavily utilized plants increased from zero to 13%. Mountain big sagebrush has declined from 1,299 to 532 plants/acre since 1982. Percent decadency has increased from 3% to 30% as more sagebrush are shaded out.

Grass and forb diversity and density are both below optimum for this kind of site. Only three perennial grasses, muttongrass, bottlebrush squirreltail, and fringed brome were encountered. Among annual grasses, cheatgrass brome is present, but not overly abundant. Forb composition is only slightly more diverse. Ten species were encountered on the density and frequency plots during the 1992 reading. The most abundant forbs include Solidago sparsiflora, thistle (Cirsium spp.), Utah milkvetch, and arrowleaf balsamroot. Most forbs are at least moderately desirable as forage.

### 1982 APPARENT TREND ASSESSMENT

Both soil and vegetative trend appear stable, however the relative deficiency of understory grasses and forbs, the amount of rock and bare ground exposed, and steep slope all contribute to a loss of soil that over an extended period may exceed the rate of soil formation. The browse component seems adequate, but herbaceous composition should be better.

### 1992 TREND ASSESSMENT

Soil movement still occurs on isolated bare areas, but erosion as a whole is not a serious problem. Basal vegetative cover increased by 75% since 1982, while bare ground declined slightly. However, rock and pavement cover combined, doubled while litter cover declined from 62% to 51%. Cryptogamic cover

declined by 80% (5% to 1%). The soil trend overall is thought to be stable. Key browse species, with the exception of curlleaf mahogany, have declined in density. Mountain big sagebrush has declined by 59%, while percent decadency has increased from 3% to 31%. Utah serviceberry, curlleaf mahogany, and Gambel oak have all increased in size making more browse unavailable to deer. Continued increases in size of the larger browse species will continue to negatively impact sagebrush, rabbitbrush, and other non-shade tolerant species. Browse trend is down. Herbaceous understory is lacking on this site. Quadrat frequencies for forbs and grasses have remained basically unchanged since 1982. Trend for herbaceous understory is stable but poor.

#### TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - stable, but poor

## DISCUSSION

### Trend Study No. 50A-21

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

This study is located on an open west to northwest facing hillside with a 25% to 30% slope. Elevation is 7,900 to 8,000 feet. The study is located on a summer range concentration area for deer. Many fawns have been observed and captured here and there is evidence (i.e., pellet groups, forage utilization levels) of a high degree of deer use. Cattle use was reported during the 1982 reading, but no recent livestock use was evident during the 1992 reading. This area occurs on the 67,000 acre Pine Valley Allotment which is grazed annually from July 15 to October 15. With the extended drought, numbers of cattle were reduced by 35% in 1990, 25% in 1991, and 15% in 1992. Curlleaf mountain mahogany gives the site its vegetative appearance, however the trees are widely spaced and generally tall enough to be unavailable to deer. Aside from mahogany and a few scattered junipers, the remaining shrubs are very low-growing and provide little of the cover normally so important on quality fawning habitat.

Soils are coarse, rocky, and shallow. Considerable bare ground (32%) was encountered during the 1982 reading. Vegetative basal cover was low and ongoing soil erosion was moderate to heavy. Many plants were pedestaled and lichen lines on rocks were well above the soil surface. Since then, basal vegetative cover has more than doubled while bare ground decreased by 53%. Some soil movement still occurs in isolated areas, but conditions have improved since 1982.

Key browse on the site consist of scattered tall curlleaf mountain mahogany and Gambel oak with an understory of low growing Parry rabbitbrush, dwarf rabbitbrush, and mountain rabbitbrush. Gambel oak is the most common browse with an estimated density of 8,265 stems/acre in 1992. A majority of the population consists of seedling and young plants indicating a healthy increasing age structure. Utilization of oak has been heavy. In 1982, 55% of the oak displayed heavy hedging (>60% of twigs browsed). This heavy use likely kept oak from increasing significantly in density between 1982 and 1992. Due to heavy browsing, mature oak measured under one foot in height in 1982. Utilization was also reported heavy during the 1992 reading. Forty-four percent of the oak sampled displayed heavy use. Mature plants are fewer in number and average nearly eight feet in height, making mature plants mostly unavailable to browsing. Percent decadency has increased from 10% in 1982 to 57% in 1992. Understory shrubs also show heavy use. Dwarf rabbitbrush has decreased from 1,200 to 732 plants/acre, while the proportion of heavily hedged plants increased from 28% to 73%. Percent decadency has also increased. Parry rabbitbrush wasn't identified in 1982 and was likely included with dwarf or mountain low rabbitbrush. During the 1992 reading, 43% of the Parry rabbitbrush encountered were heavily hedged. Mountain low rabbitbrush decreased in density 32% since 1982, while the proportion of heavily hedged plants rose from zero to 67%. It was reported during the 1992 reading that some of this use was caused by rabbits.

Grasses and forbs dominate the site. Nine species of grasses were encountered, with bottlebrush squirreltail, letterman needlegrass, and muttongrass, being the most abundant. Forbs are also diverse and abundant. Nineteen species of forbs were sampled during the 1992 reading. Arrowleaf balsamroot is by far the most abundant with a quadrat frequency of 48% in 1982, increasing to 78% by 1992. Other important forbs include redroot eriogonum, clover, and Utah deervetch.

### 1982 APPARENT TREND ASSESSMENT

Soil trend when evaluated from a comparison of rates of soil formation and soil loss is probably downward. There is inadequate vegetative cover to prevent widespread soil movement. Soil loss, in turn, tends to inhibit or prevent establishment of a dense, herbaceous cover. Conversely, without good herbaceous cover, erosion

will continue on the site. Vegetatively, the area is heavily impacted by deer (forbs and browse) and livestock (grasses) use. Such use is well documented by the abundance of pellet groups, the level of utilization, and highlining of mahogany and juniper. Gambel oak, which is the likely key browse species for this area is highly vigorous and shows little evidence of decline. Herbaceous composition includes some aggressive increasers, but also some highly palatable species. For the present, vegetative trend can be considered stable or perhaps slightly downward.

#### 1992 TREND ASSESSMENT

Soil conditions have improved since 1982 due to increases in herbaceous vegetation cover. Basal vegetation cover has increased by 67%, while bare ground has declined by 53%. Key browse on the site have overall, declined in density, increased in decadency, and are increasingly heavily browsed. Trend for browse is down. Quadrat frequencies for grasses and forbs have increased significantly since 1982, indicating an upward trend. Improved soil and herbaceous trends are likely the result of grazing reductions and above normal amounts of precipitation this spring.

#### TREND ASSESSMENT

soil - improved

browse - down

herbaceous understory - up

## DISCUSSION

### Trend Study No. 50B-3

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The New Castle Reservoir trend study monitors critical deer winter range located west of Newcastle Reservoir. The study site is on a moderately steep (40%) south facing hillside dominated by a sagebrush-grass community, interspersed with scattered green ephedra, Colorado pinyon, and an occasional large Stansbury cliffrose. Elevation of the site is 5,600 feet.

Soils are derived from basalt. Soil depth is relatively shallow and texture is coarse and well drained. There is a general lack of perennial herbaceous cover leading to a lack of litter. Since 1982, percent cover for rock and pavement combined has increased from 47% to 63%. The increase in rock and pavement and plant pedestaling would indicate erosion is taking place. Soil and climatic conditions will make seedling establishment difficult.

The key browse species, Wyoming big sagebrush, a relatively palatable plant accounts for 36% of total browse density. Currently this population is static, but 26% of the plants are now decadent compared to 11% of the plants in 1982. Age class distribution indicates mature plants are the most prevalent. There is nearly an equal number of young and seedling plants combined as there is decadent plants. Vigor has improved and so has utilization which is now light to moderate. Green ephedra, an important secondary species, also appears to be a stable population and is less heavily hedged than Wyoming big sagebrush. The principal invader/increaser shrub is narrowleaf low rabbitbrush. Of 93 individuals encountered in 1992, none showed any use as compared to 58% of the 71 individuals encountered in 1982, which were in either form class 2 or 3, indicating moderate to heavy use. Even though narrowleaf low rabbitbrush had relatively low vigor and few young or seedling plants in 1992, the population increased by 24%.

Perennial grasses are moderately abundant, but consists primarily of increasers such as bottlebrush squirreltail and galleta grass. Muttongrass, bottlebrush squirreltail, and Indian ricegrass are occasional residents and appear to have stable populations. Cheatgrass brome is on the site, but was not recorded under the monitoring methods utilized before July of 1992. By comparing pictures between years, the cheatgrass brome doesn't appear to be increasing and seems to only grow primarily under the crowns of the Wyoming big sagebrush.

Several new forbs were encountered in 1992, although they are very sparse and are not a significant forage source or soil protection factor. Low fleabane daisy, globemallow, Douglas chaenactis, and an Astragalus sp. were the only perennial forbs encountered.

### 1982 APPARENT TREND ASSESSMENT

Soil conditions are poor and probably getting worse. Much soil has already been lost, leaving large expanses of pavement and rock. Surface soil temperatures are likely quite high and drainage is so rapid that seedling establishment is almost certainly very difficult. Vegetational trend is harder to assess, but in view of soil conditions, it must also be down.

### 1992 TREND ASSESSMENT

Since the 1982 reading, the soil condition has appeared to decline with pedestaling around the plants. Rock and pavement cover combined have increased from 47% to 63%. The Wyoming big sagebrush population is stable to improving, which is evidenced by abundant seedlings and better form and vigor. The narrowleaf low rabbitbrush population should be monitored for possibly further increase. Herbaceous trend is slightly up

with the increase of vegetative cover.

TREND ASSESSMENT

soil - slightly down

browse - stable

herbaceous understory - slightly up

## DISCUSSION

### Trend Study No. 50B-7

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Swett Hills trend study is located on critical deer winter range on the east side of the Swett Hills. The study is near the north end of a small north-south oriented cove or alluvial plain that separates Swett Hills and the Eightmile Hills. Terrain is gentle with a slight southeast aspect and a slope of 5%-10%. Site elevation is 5,750 feet. The range type is sagebrush-grass with a moderate density of pinyon and juniper trees. The site is located in an old chaining (probably only one-way) where many of the junipers survived the treatment. The site is an ecotone and may eventually be encroached by pinyon and juniper.

Soils are moderately deep and very rocky with a caliche layer that may restrict rooting depth of some species. Ground cover is limited to shrub crowns, rock, and pavement. Dead cheatgrass comprises the bulk of litter cover and offers minimal soil protection. Rock and pavement cover combined have increased from 15% to 36% cover, while bare ground decreased from 44% cover to 31%.

The key browse species, Wyoming big sagebrush, accounts for 80% of total shrub density in 1992, an increase from 74% in 1982. Although the Wyoming big sagebrush population has increased, so has percent decadency, from 2% to 33%. Those with poor vigor has increased from 2% to 26%, most classified as chlorotic or dying. The amount of use has shifted from moderate to heavy. Palatable forage from other species is limited to an occasional mature Stansbury cliffrose, which has decreased in density since 1982 from 66 plants/acre to 33 plants/acre. Utilization of available portions of Stansbury cliffrose is heavy. A concern is the increase of broom snakeweed, although the number of seedlings decreased and percent decadence has increased. The number of juniper trees is staying constant, and doesn't appear to be encroaching at this time.

Forbs and grasses are scarce and are not an critical component for a winter range. Species composition of both groups consists principally of increasers.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is declining as evidenced by the amount of bare ground, erosion pavement, and surface rock. Erosion is not dramatic, but is wide spread. Small gullies and rills are present everywhere. Vegetation trend is stable over the short term, but probably down in the long term. The key browse species seems stable for the moment, but eventually will be adversely impacted by increasing amounts of broom snakeweed and encroaching Junipers.

### 1992 TREND ASSESSMENT

Bare ground has decreased and rock and pavement have increased indicating some erosion and a downward trend. Vegetation is still stable with poor composition and producing very little protective ground cover. Wyoming big sagebrush increased in density by 16% and percent decadency also increased. It appears to be stable to slightly increasing, but again may be impacted by an increase of broom snakeweed.

#### TREND ASSESSMENT

soil - slightly down due to erosion

browse - slightly up

herbaceous understory - stable

## DISCUSSION

### Trend Study No. 50B-8

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Oak Spring trend study samples deer winter range southwest of Oak Springs on Iron Mountain. The study area is within a Utah juniper type on a northeast facing 10%-20% slope at an elevation of 6,520 feet.

Soils are shallow and rocky with a hard pan at several inches below the surface. Tree interspaces are occupied mainly by bare ground or erosion pavement. Like many juniper or pinyon types, this area has a fair aerial vegetative cover, but generally poor basal cover (herbaceous cover), as a result soil loss has occurred with rock and pavement now protecting the soil.

Browse composition consists of both desirable and undesirable species. The more preferred include Stansbury cliffrose, antelope bitterbrush, Wyoming big sagebrush, and true mountain mahogany. These species account for 29% of total browse density. All of the species mentioned are important and should be considered in any management plan. Currently these species are stable and show an increase in amount of hedging. Shrubs of intermediate desirability, which include white rubber rabbitbrush and a shrubby eriogonum, comprised 16% of browse density in 1982. They were not encountered in 1992. The remaining 71% of browse population consists of undesirable species, such as golden pricklypear, broom snakeweed, echinocactus, and an overstory juniper and pinyon. Golden pricklypear has an increased population of nearly 200 plants/acre, but does not appear to be a major threat to the community, although it is abundant. Further increase of this species should be discouraged.

Grasses are sparse and hence are of small importance. Three species, bottlebrush squirreltail, purple three-awn, and muttongrass were sampled.

Forbs are scattered, but more abundant than grasses. Composition consists largely of annuals and low value perennials. Among perennial forbs, mat penstemon is by far the most abundant. Annual forbs are fairly common and the most notable is owlclover (Orthocarpus spp.). Utilization of forbs is uniformly light.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is declining. Protective ground cover is simply inadequate to prevent serious soil loss from high intensity summer storms. Vegetative trend is stable with a low level of production. Browse composition is dominated by undesirable species which, however do not show obvious signs of increase. Wyoming big sagebrush, one of the better shrubs, may be declining. Understory production is negligible. This area could be greatly improved by chaining and seeding.

### 1992 TREND ASSESSMENT

Soil is still on a downward trend as evidenced by a decrease in bare ground contributing to a corresponding increase in rock and pavement. Vegetative trend is stable and still at a low rate of production and probably always will be if the site is left alone. The most abundant browse species are undesirable and increasing slightly. The Wyoming big sagebrush population is stable but at a very low density.

#### TREND ASSESSMENT

soil - continuing downward

browse - stable, but key browse is at a very low density

herbaceous understory - stable, but poor with very low numbers

## DISCUSSION

### Trend Study No. 50B-9

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Whiterocks Reservoir trend study is located on deer summer range slightly southeast of Whiterocks Reservoir. The study is on a low ridge with minimal slope (5%) and an elevation of 8,300 feet. The range type is sagebrush-grass or low sagebrush with a fairly abundant herbaceous understory. Livestock graze the allotment from July 15-October 15.

Even though the soils are exceptionally rocky, they support good plant growth. Many plants can be found growing in rock crevices or depressions where a few inches of soil is present. Erosion was reported minimal on the study site, but there are some gullies on the nearby slopes. Soil formation may exceed soil loss as weathering and breakup of surface rock appear to be occurring at a rapid rate.

Vegetation on the site is dominated by mountain big sagebrush which comprises 47% of the browse population. This population has increased by 58% since 1982. There are nearly as many seedlings present (6,933 plants/acre) as there was young, mature, and decadent combined. Other important shrubs include mountain low rabbitbrush and slender buckwheat. Slender buckwheat increased in density from only 466 plants/acre in 1982 to 3,199 plants/acre in 1992. The palatable mountain low rabbitbrush increased from 1,933 plants/acre to 2,466 plants/acre. A misidentification of Chrysothamnus nauseosus may have occurred in 1982 and might have been combined with Chrysothamnus parryi nevadensis. The occurrence of the Chrysothamnus spp. may indicate heavy grazing in the past. All browse species were light to moderately hedged and in good vigor.

Grasses and forbs are both very abundant and diverse and are equally important to deer, as browse. Ten grasses and 27 forbs were encountered. Among grasses, the most abundant are Letterman needlegrass, mutton grass, Kentucky bluegrass, western wheatgrass, and blue grama. Overall grass composition is dominated by increasers. Utilization of grasses is light, with prairie junegrass receiving perhaps the greatest attention.

Forb composition includes a small variety of succulent species that receive moderate use. The more abundant forbs include desert phlox, Eaton fleabane, Lupinus holosericeus, redroot eriogonum, and pale stickseed. Few annual forbs were identified, but there are a number of perennial or biennial increasers. Aster sp., Machaeranthera sp., mountain dandelion, rock goldenrod, rose pussytoes, common dandelion, and owlclover are all in this category. Several of these species have increased in the past, but appear stable now.

### 1982 APPARENT TREND ASSESSMENT

Soil and vegetative trend are essentially stable. There is little obvious evidence that drastic vegetational changes are occurring. However, the abundance of increaser species, especially stickyleaf low rabbitbrush, needlegrass species, blue grama, and forbs, such as rock goldenrod should be closely monitored.

### 1992 TREND ASSESSMENT

Soil appears to be stable and improving with minimal erosion reported. There is very little bare ground exposed and interspaces are covered by litter (54%) and vegetation (24%). Grass and forb quadrat frequency has stayed nearly the same for most species. Browse has increased on the site, but doesn't seem to be effecting the forbs or grasses. The key browse species is mountain big sagebrush which has a population that has the potential to continue expanding.

### TREND ASSESSMENT

soil - slightly up

browse - up

herbaceous understory - up

## DISCUSSION

### Trend Study No. 50B-11

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The "West of Long Flat" range trend study is within deer summer range located approximately one-half mile west of Long Flat and close to the Whiterocks-Rencher Peak trail. The general vicinity of the study area is characterized by diverse, broken terrain with many small swales and drainages separated by low lying, rocky ridges and hills. The swales are narrow and contain sagebrush-grass and occasional aspen clones. Higher ground is occupied by mixed curlleaf mountain mahogany and Gambel oak. This area is excellent habitat and several does and fawns were observed using it. A spring is also located near the study site. The actual study is on a small ridge with a slight east-northeast aspect. Slope is 10% or less and an elevation of 8,100 feet. Cattle are allotted to the area from July 15-October 15.

Soils are relatively shallow, relatively coarse and interspersed with large expanses of slickrock and exposed boulders. Erosion is slight with good litter cover, although rock and pavement combined have increased from 20% to 38% cover.

Browse composition consists of a variety of generally favorable species. Most conspicuous, although not most abundant, is curlleaf mountain mahogany. This species, because of its tree-like growth form, provides relatively little forage, but has high value as cover. The principal forage shrubs in order of abundance are Gambel oak, mountain big sagebrush, black sagebrush, and mountain snowberry. Oak is the most important and is the only one of the three to show much evidence of use. Gambel oak has expanded its population since 1982 from 6,399 stems/acre to 13,065 stems/acre. In 1982, black sagebrush may have been misidentified in 1982 and combined with mountain big sagebrush. The sagebrush population collectively is slightly increasing and shows good vigor and light utilization.

Grasses and forbs are moderately abundant and diverse. Important grasses include bottlebrush squirreltail, muttongrass, and Letterman needlegrass. Utilization is light overall with muttongrass receiving the greatest use.

Forbs are especially important on fawn rearing habitat and the site has a good variety. The more important species include arrowleaf balsamroot, Leonard penstemon, redroot eriogonum, and sandwort. Almost all forbs show evidence of at least light utilization. However, Leonard penstemon is most preferred as it shows occasional heavy use.

### 1982 APPARENT TREND ASSESSMENT

Overall range trend is stable. Soil loss is occurring, but at a relatively slow rate. The plant community should not be seriously affected. With respect to vegetation, the most striking feature is the preponderance of young Gambel oak. If these mature to become large tree-like forms, the basic character of the site will be altered. However, it may be that site conditions and animal use will preclude the growth of tree-like forms. Grass and forb composition and density, while adequate, are perhaps slightly below optimum.

### 1992 TREND ASSESSMENT

Some soil loss has occurred since the last reading as evidenced by the increase in rock and pavement. Litter cover is improving and should help decrease erosion. The Gambel oak population more than doubled and has the potential to keep increasing. While most grass and forb quadrat frequencies increased, the amount of vegetative cover decreased slightly and composition is probably still below optimum.

#### TREND ASSESSMENT

soil - slightly down due to erosion

browse - stable

herbaceous understory - stable

## DISCUSSION

### Trend Study No. 50B-13

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Atchinson Mountain range trend study is located on low summer or transitional range at 6,700 feet elevation. The range type is sagebrush-grass on a 10% north-northwest slope. The surrounding hills are covered with Gambel oak and Utah serviceberry. Water can be found in a creek 1/4 of a mile to the southwest. The area is within the Dixie National Forest and is grazed by 100 head of cattle from August 1-October 15.

Soils are well drained, rocky and of moderate depth. Soil movement and erosion is minimal. A few small gullies are present, but are not enlarging much due to the gentle terrain. Ground cover is composed primarily of litter (62%), and there is now only 11% bare ground as compared to 22% exposed bare soil in 1982.

The key browse species is mountain big sagebrush which had been identified as basin big sagebrush in 1982. The mountain big sagebrush has a population that is light to moderately utilized and shows good vigor. Most plants are vigorous with 15% being classified as chlorotic or dying, however these plants were also classified as decadent. Approximately 33% of the encountered plants were decadent with few seedlings and no young identified. The population has increased from 1,733 plants/acre in 1982 to 2,199 plants/acre in 1992. The most abundant shrub on the site was stickyleaf low rabbitbrush with a density of 3,998 plants/acre and an age structure that is more typical of an expanding population. Other shrubs include antelope bitterbrush and the increaser broom snakeweed. The broom snakeweed density increased from no plants to 2,798 plants/acre and should be closely monitored.

The principal grasses are western wheatgrass, an unidentified Agropyron sp., and bottlebrush squirreltail. All are moderately aggressive increasers of fair to good forage value. Other grasses of more occasional occurrence include subalpine needlegrass, Letterman needlegrass, and prairie junegrass. Although not counted or recorded on the plots, cheatgrass brome was observed in patches.

The most conspicuous forbs were Lupinus holosericeus and arrowleaf balsamroot, both of which are large succulent species. There are a few undesirable increasers and annuals, but a high proportion are desirable forage plants. Redroot eriogonum and bastard toadflax showed light use by livestock this spring.

### 1982 APPARENT TREND ASSESSMENT

Judging from the apparent trend evaluation, soil trend is declining. Dispersion of ground cover is variable and there is obvious sheet and gully erosion. Vegetative trend may also be declining. The most obvious clues are the age, form, and vigor distribution of the key species, the relative abundance of stickyleaf low rabbitbrush and broom snakeweed, and species composition among grasses.

### 1992 TREND ASSESSMENT

Soil trend is improving with the increase of vegetative cover and the decrease in bare ground cover. Rock and pavement cover have increased from 5% to 9% and it was reported that evidence of past soil erosion was slight. Grass and forb quadrat frequency totals increased which coincides with the increase on vegetative cover. Density for all browse species increased which might be considered bad because the three browse species are increaser/invasers. The stickyleaf low rabbitbrush and broom snakeweed populations need to be monitored for increase. The increase in mountain big sagebrush is good and it should be able to sustain itself.

### TREND ASSESSMENT

soil - up

browse - slightly down, due to increases in increaser/invader species

herbaceous understory - slightly up

## DISCUSSION

### Trend Study No. 50B-16

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The West Valley range trend study is located on a key summer deer range in West Valley. The site has an elevation of 9,200 feet and is one of several dry meadows or parks located near the head of the Left Fork of the Santa Clara River. Dry meadows in this area are rather small (20 to 40 acres) and normally surrounded by a narrow band of aspen, backed by an almost limitless acreage of rather sterile dark timber. Deer use the meadows extensively for foraging. Many deer beds and pellet groups were observed in the West Valley. This site is on an area of the Pine Valley Mountains that has not been grazed by livestock since the 1960's. Meadow areas, such as West, North, South, and Whipple valleys, are undoubtedly at least locally important to deer and possibly elk in the future. This area has had an increase in recreational horse use also (Russell 1996).

Soils are the result of sedimentation from the surrounding higher country. Characteristically, soils are moderately deep, relatively fine textured, and contain abundant organic matter. Fertility and water holding capacity is high. Erosion is nearly nonexistent because of the dense vegetative and litter cover and lack of slope.

Vegetatively, West Valley is a grass-forb meadow. No browse species were encountered, although in a few localized spots, limited numbers of shrubby cinquefoil were observed. Herbaceous growth is very lush with grasses and forbs in nearly equal abundance. On the lower portions of the valley (i.e., close to the drainage channel), the range type is more of a wet meadow. Here sedges, rushes, and water-loving grasses, such as redtop (*Agrostis alba*) and tufted hairgrass (*Deschampsia caespitosa*), are dominant. The site is actually a drier area and these species are much less abundant. The principal species include Kentucky bluegrass, subalpine needlegrass, and slender wheatgrass. Annual grasses did not occur on the study site, however some rather large patches of annual bluegrass (*Poa annua*) were observed nearby. Grass species show evidence of light grazing by wildlife. Forbs are only slightly more abundant than grasses. The more common species include slender cinquefoil, clover, fleabane daisy, and western yarrow. Most species on the site are undesirable increasers and should be indicators of trend. The undesirable species have mostly decreased, most noticeably orange sneezeweed, western yarrow, rosy pussytoes, and fleabane daisy. Mountain bluebell and American bistort showed a considerable degree of grazing with American bistort appearing especially preferred.

### 1982 APPARENT TREND ASSESSMENT

Current soil and vegetative condition is good. With respect to trend, soil seems stable or even improving. Vegetation trend depends upon a perceived management objective which should probably center on the relative abundance of desirable grasses and forbs. If more forbs are desired, the trend may be slightly down because the grass component is highly vigorous and probably has a competitive edge at this point.

### 1992 TREND ASSESSMENT

Bare ground increased from 4% to 7%, while vegetative cover slightly decreased from 24% to 20% cover. The extended drought could easily explain these slight downward trends. The soil trend is stable with no erosion reported on the site, due to thick grass and forb cover and negligible slope. Total grass and forb quadrat frequency decreased overall although several species such as *Stipa columbiana*, *Stipa lettermani*, *Mertensia ciliata*, *Solidago parryi*, and *Taraxacum officinale* increased. Herbaceous understory is stable.

#### TREND ASSESSMENT

soil - stable

browse - none

herbaceous understory - stable

## DISCUSSION

### Trend Study No. 50B-7c

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Motoqua trend study is located on winter range in the lower portion of the East Fork of Beaver Dam Wash. Elevation is approximately 4,040 feet with a slope of 10% and westerly aspect. The range type is southern desert shrub and is totally shrub dominated. Perennial herbs are nearly nonexistent. Deer use appears light and cattle grazing is evident.

Soils, typical of black brush communities in this area, are very shallow, rocky, and appear heavily eroded. Erosion pavement occupies half of the ground surface. Exposed soil covered 14% of the ground surface in 1982. It is now down to 4% in 1992. Rock cover increased from 3% to 15%. Litter cover (34%) is composed almost entirely of ephemeral annual grasses, such as cheatgrass and foxtail brome. Basal vegetative cover increased from less than 1% in 1982 to 4% in 1992.

The key browse species include blackbrush with lesser amounts of desert bitterbrush. Blackbrush is the most numerous species and has increased from 1,866 plants/acre in 1982 to 2,133 by 1992. Desert bitterbrush consists of scattered, five foot high, mostly decadent plants with an estimated density of 433 plants/acre in 1982, now up to 566 in 1992. Percent decadency of bitterbrush has increased from 8% to 77%. Utilization of both species is light to moderate, but blackbrush often appears hedged, at least partly, because of its normal growth habit. Percent decadency has increased from 21% in 1982, to 28% in 1992. Overall vigor has improved since 1982 when 54% of the blackbrush sampled displayed poor vigor. During the 1992 reading, only 3% of the blackbrush displayed poor vigor, likely due to the above normal precipitation this past year. On nearby burned areas, desert bitterbrush predominates as blackbrush is well-known as intolerant of fire. This differential response to fire may have management implications. Other browse in the area includes green ephedra, Mohave desert rue, and datil yucca. The latter two are essentially worthless as forage plants.

Herbaceous plants are nearly absent from the site, which is typical of blackbrush dominated communities. Bottlebrush squirreltail was the only perennial grass encountered or observed and it was rare. Annual brome grasses are present, but not abundant. Annual or perennial forbs are few. None were encountered on the study plots during the 1982 reading. In 1992, a few individuals of gooseberryleaf globemallow and an Astragalus sp. were encountered.

### 1982 APPARENT TREND ASSESSMENT

This site is typical of blackbrush dominated areas in this part of the state. Soils are shallow and covered with rocks and pavement. Perennial herbaceous vegetation is usually scarce. On this site, soil movement is noticeable and plants appear pedestaled. Pavement covers half of the ground surface. Percent bare ground is fairly low for a site like this at 14%. The shrub component seems stable, barring fire or some other extraordinary influence.

### 1992 TREND ASSESSMENT

Soil conditions have improved slightly since 1982. Basal vegetative cover has increased from less than one percent to four percent, while bare ground dropped from 14% to 4%. Pavement cover remained the same while rock cover increased from 3% to 15%. Some soil movement is still occurring, overall protective ground cover has increased from 86% to 96% which should provide increased protection of the soil and reduce the amount of erosion occurring. Soil trend is slightly up, but still in poor condition. Key browse on the site have increased in density and show improved vigor. Trend for browse is up. Herbaceous vegetation

is severely deficient and of no consequence on this site. Bottlebrush squirreltail, the only perennial grass encountered, occurred in only 2% of quadrats. The two forbs sampled had a combined quadrat frequency of only 12%. Trend for these few species is up slightly from 1982.

TREND ASSESSMENT

soil - slightly improved, but still poor condition

browse - up for blackbrush

herbaceous understory - nearly non existent, but slightly up

## DISCUSSION

### Trend Study No. 50B-12c

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Rattlesnake Spring range trend study is located near Rattlesnake Spring, a year-round water source. Deer and cattle tend to concentrate in this area during the summer. Cattle stay mostly in the canyon bottom, while deer use the slopes to a greater extent. Seven hundred and thirty-two head of cattle are allotted to the area from August 20-November 15. Deer are known to use the area for fawn rearing. Elevation is approximately 6,400 feet with a slope of less than 20% and a northerly aspect. The range type is oakbrush interspersed with mountain big sagebrush openings.

Soil is gravelly, well drained, and shows moderate to high erosion, especially on the upper part of the site. Ground cover is composed principally of litter. Open exposed areas of bare ground in between oak clones show the most erosion.

The key browse species are Gambel oak, Utah serviceberry, and mountain big sagebrush. Gambel oak, the most abundant shrub, has exploded in density from 7,265 stems/acre in 1982 to 17,599 stems/acre by 1992. Reproductive potential remains high. Utilization is light to moderate and vigor is good. Black sagebrush was encountered in 1992, but not mentioned in the 1982 report. This would indicate a possible misidentification with mountain big sagebrush. Combined, the sagebrush increased in density from 2,132 to 3,731 plants/acre. Utilization of sagebrush has increased since 1982. Currently 24% of the plants sampled displayed heavy hedging (>60% of twigs browsed). Vigor is good. Utah serviceberry increased in density by 46% since 1982. Age class distribution indicates continued growth. Fifteen percent of the serviceberry were heavily hedged and vigor has improved since the last reading. Other browse on the site include snowberry, woods rose, rabbit brush, and an Eriogonum.

A good variety of grasses occur on the site, yet none are very dense. Total grass production from perennials is low. Bulbous bluegrass (Poa bulbosa), a short lived perennial, is the most numerous grass followed by intermediate wheatgrass, a seeded species. Muttongrass and bottlebrush squirreltail are also fairly common. These species all exhibited moderate to high levels of use in 1982. Utilization of grasses and forbs were not noted during the 1992 reading. Annual cheatgrass brome is also fairly abundant on this site within the shrub interspaces.

Forbs are diverse, but not abundant. Fourteen species were encountered in 1992. The most abundant included Louisiana sage, thickleaf peavine, and a Trifolium species. Forbs, especially the more palatable species, such as showy goldeneye, redroot eriogonum, and Eaton penstemon, were moderately grazed in 1982.

### 1982 APPARENT TREND ASSESSMENT

Range trend is stable. There are some small gullies and evidence of sheet erosion, but the rate of soil formation appears at least equal to the rate of loss. However, ground cover could be better in the shrub interspaces. Grazing pressure from cattle and to some extent deer have tended to depress perennial grasses and helped allow the invasion of cheatgrass. The browse component is productive and vigorous and is in little danger of declining. Perennial forbs and grasses occur at less than optimum densities, with vigor, especially of grasses, being depressed.

## 1992 TREND ASSESSMENT

Erosion is still a problem on this site even though basal vegetative cover increased from 1% to 4% and bare ground decreased from 14% to 5%. Rill erosion, soil pedestaling around plants, and exposed plant roots are evident mostly in the unvegetated shrub interspaces. However, total protective ground cover has increased from 86% to 95% indicating improved conditions. Browse densities have increased for the key species. Vigor has improved for serviceberry, but utilization is heavier on serviceberry and sagebrush. Oak has shown a dramatic increase and possesses a dynamic reproductive potential indicating further growth. Continued increases in oak density will likely have a negative impact on other browse species and herbaceous plants. The herbaceous understory is diverse, but not abundant. Quadrat frequencies of grasses and forbs have increased since 1982 indicating a slightly upward trend.

### TREND ASSESSMENT

soil - improved, but still in poor condition

browse - up

herbaceous understory - up slightly, but poor production

## DISCUSSION

### Trend Study No. 50B-14c

\*\*\* This site was not read in 1998 and is being discontinued. Only text from the 1992 "Utah Big Game Range Trend Studies" report has been included. Consult the 1992 report for maps and data tables.

The Pinnacles range trend study is in Burnt Canyon near the Pinnacles rock outcrop at an elevation of 5,720 feet. It lies on a 25% slope with a north aspect. The area is nominally deer summer range, but elevations are relatively low and during light winters deer would occupy the area. The range type is mixed mountain brush with Utah serviceberry the dominant overstory plant. Signs of deer and cattle use were evident during the 1992 survey. Grazing by 471 head of cattle is alternated each year from spring to fall.

Soil is coarse, rocky, and well drained. Surface rocks are large. Erosion and soil loss are minimal, even though there are many bare areas in the shrub interspaces. Litter cover is high and is largely composed of dead cheatgrass brome and oak leaves.

Browse on this site are very abundant and thick with an overall estimated density of 12,264 plants/acre in 1982 and 15,530 in 1992. Travel through the area is possible only on game trails. The key browse species is Utah serviceberry, which comprised 90% of browse composition in 1982 and 71% in 1992. Outside the immediate study site, serviceberry is somewhat less dominant. Numerous seedlings and young were counted in 1992, a large percentage of which were judged unavailable to deer because they occurred within a dense clump of some other shrub, usually another serviceberry. Mature serviceberry, which averaged 2½ by 1½ feet in 1982, have increased significantly in size. They now average nearly 6 feet in height with a crown of 3 feet which effectively limits the amount of forage available to deer. Utilization is light to moderate with a few individuals exhibiting heavy use. Juniper rust was a factor affecting overall vigor in 1982, when 75% of the shrubs sampled were infected. This disease, also called Cedar-apple rust, was very widespread on this herd unit in 1982, but does not seem to be a serious fatality factor. During the 1992 reading, no serviceberry displayed juniper rust. The incidence of infection obviously fluctuates greatly between years. Other shrubs, in their approximate order of abundance are Gambel oak, mountain big sagebrush, curleaf mountain mahogany, and desert gooseberry. Gambel oak has increased from 400 to 2,866 stems/acre since 1982. Seventy two percent of the population consist of young plants. Mature individuals have more than doubled in height since the last reading. Continued increases in size of the major browse species will make even more forage unavailable to deer.

Herbaceous composition is poor and dominated by cheatgrass brome. The only perennial grasses encountered were bottlebrush squirreltail, muttongrass, and mountain brome, all of which were strictly occasional in their occurrence. Forbs are slightly more diverse. Ten perennial species provide a minimal amount of forage.

### 1982 APPARENT TREND ASSESSMENT

Soil trend is satisfactory. Although basal vegetative cover is slight, aerial shrub cover is quite dense and provides protection from raindrop impact. High intensity storms will cause some soil loss. However, the current situation appears stable. The vegetative trend points toward an increasingly dense shrub canopy dominated by Utah serviceberry. This species appears to be expanding its current dominance of the site. Herbaceous understory is badly depleted and shows no sign of recovery or increase.

### 1992 TREND ASSESSMENT

Protective ground cover has improved slightly since 1982 (91% to 93%). Erosion is still occurring on some open areas, but overall it is minimal. Trend for soil is up slightly. Browse on the site is abundant, thick, and increasing, making much of the forage unavailable. The thick nature of the browse makes travel through the

area difficult except on trails. This study should be moved up slope where browse is more accessible and more likely utilized. Overall browse trend is up. The herbaceous understory is deficient and composed mostly of cheatgrass brome. Quadrat frequencies have increased slightly for grasses and forbs indicating a slightly upward trend. Herbaceous understory will continue to be deficient unless the site experiences some sort of disturbance like fire which would benefit the area.

TREND ASSESSMENT

soil - stable to slightly up

browse - up, but becoming more unavailable

herbaceous understory - slightly up, but poor composition